

MACHINE & TOOL ENGINEERING

The

NOVEMBER 1942

TOOL ENGINEER

Official Publication of the American Society of Tool Engineers

Fray RAM TYPE
NO. 9
HORIZONTAL & VERTICAL
MILLING MACHINES

Fray vertical
All-Angle head
1 h.p. motor
spindle No. 9
Brown & Sharpe

Turret Head
Calibrated—360°

Horizontal spindle
back gear control

Table feed
speed control

Power feed
to table

Ram cross
travel—10"

Horizontal spindle
Nat. standard
No. 40 taper

Table working
surface—9½"x36"

Cross travel—9"
Longitudinal Travel—20"

Vertical
travel—16"

Speed control
horizontal spindle

Motor, horizontal
spindle—3 h.p.
(in base)

• Write for folder on
the Fray No. 9

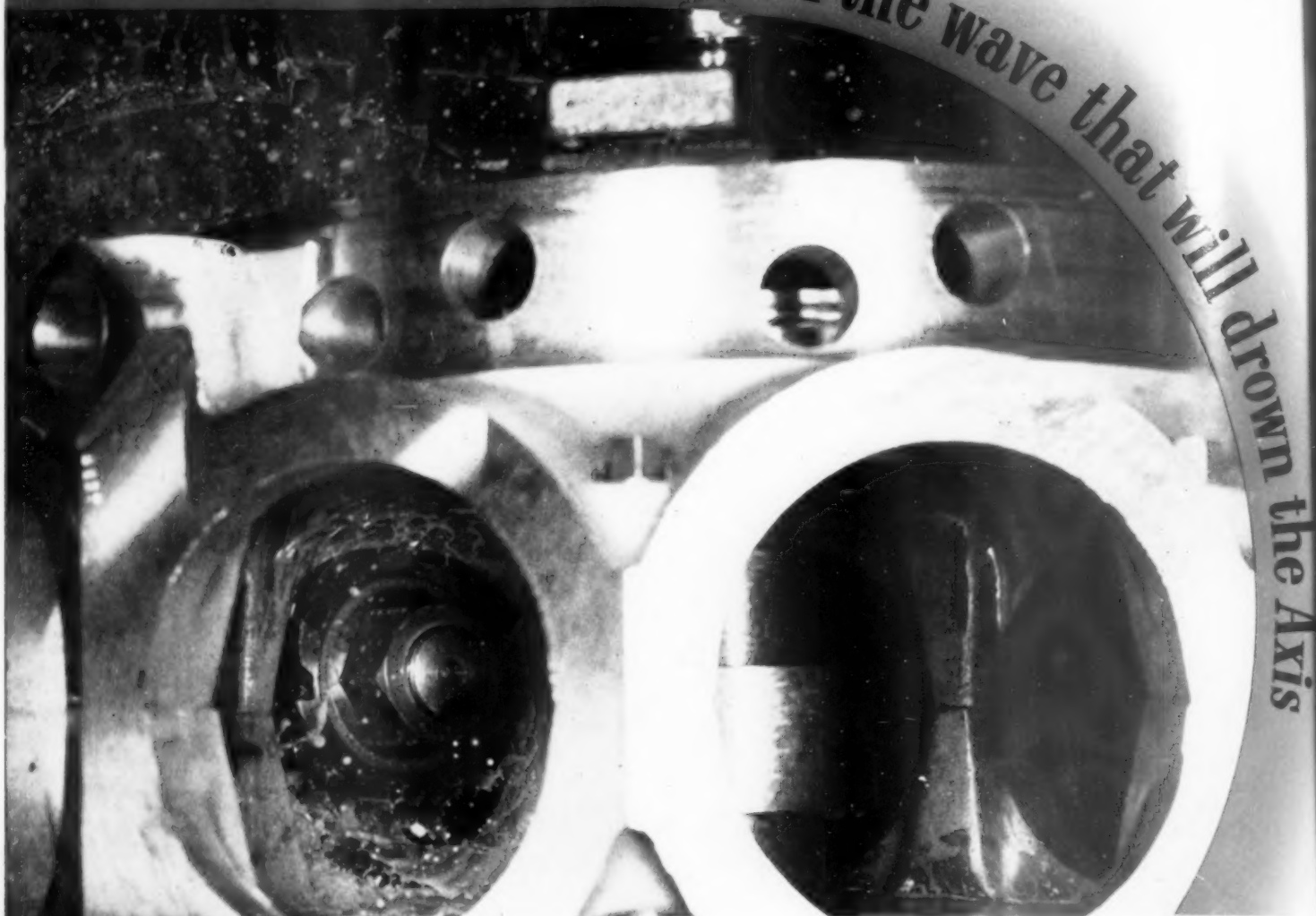
Fray
MACHINE TOOL CO.

505 W. WINDSOR • GLENDALE, CALIFORNIA

PUBLISHED BY THE BRAMSON PUBLISHING COMPANY

ONE SMALL SPLASH

of the wave that will drown the Axis



Frozen PHOTO
1/100,000 SEC ACTION

W Photo—Unretouched

PEEKING at you through the left porthole is a P&W cutter on the job. The work — an aircraft engine crankcase — stands still. The cutter makes its way around the face of a cylinder hole, slicing it down to design size with precision and dispatch.

As you'll judge from the flying coolant at the upper left, this is one of the splashiest jobs in metal working — which indicates the cutting speed and power of this P&W cutting tool.

Wherever *accurate* cutting is vital in American industry, P&W cutters, taps, dies, reamers, and end mills now are pounding out production 24 hours a day . . . hastening the time when we'll return a solid sock in the face for that slinking stab in the back.

Don't spare the pressure. Your P&W tools can take it.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT



STANDARD
Dial Snap Gages

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YOUR PARTS
THRU
42nd
PRODUCTION"

STANDARD GAGE CO., INC.
DOUGHERTIE, NEW YORK

Save WEIGHT · SPACE · TIME

HOLO-KROME *fibro forged* SOCKET SCREWS

Here's the Facts · you do save

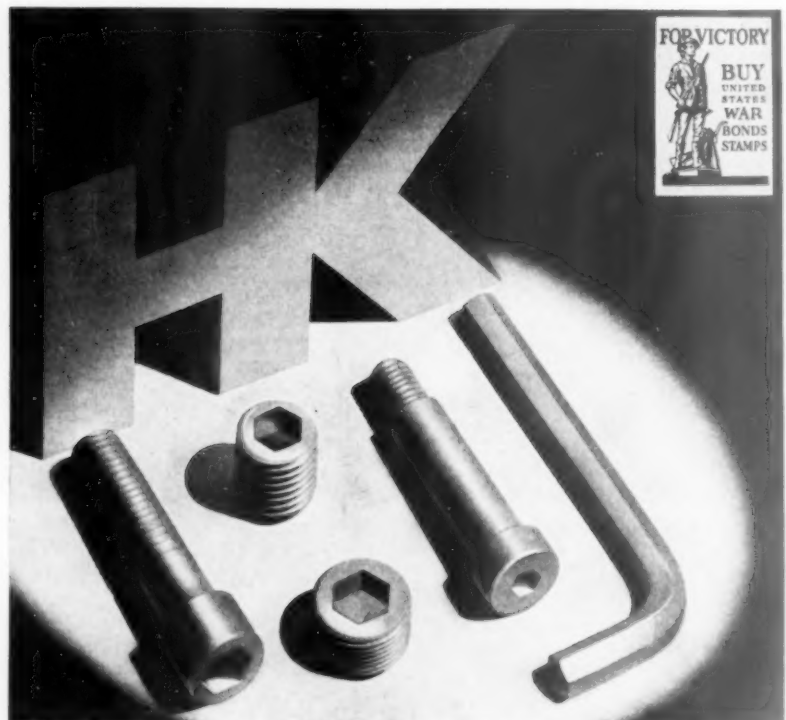
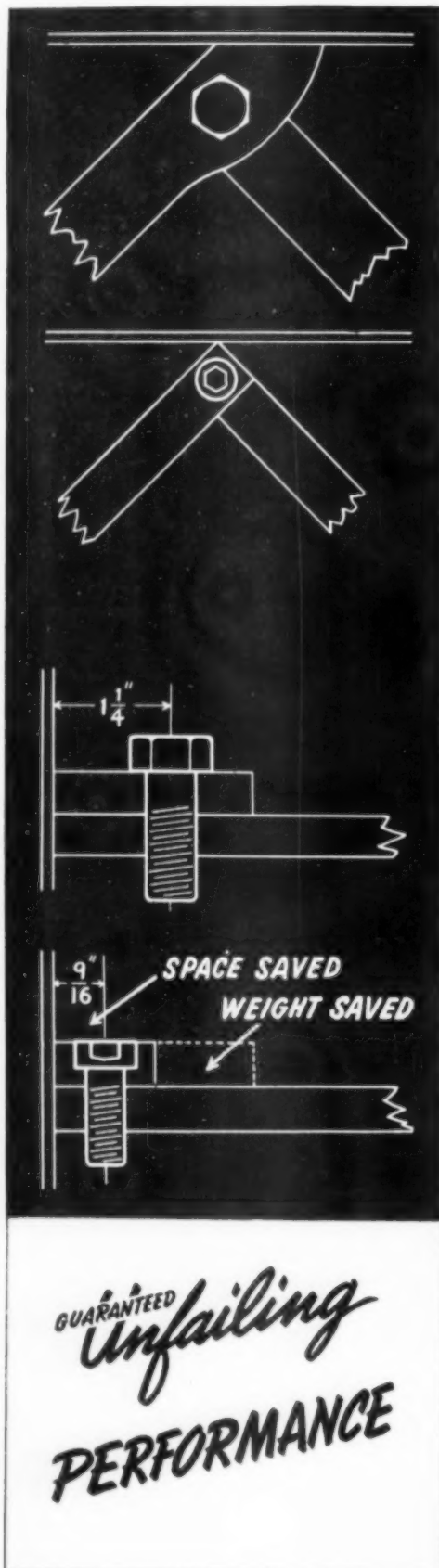
WEIGHT resulting in compact and efficient design.

SPACE saving every inch of valuable space because of the closer application in corners and hard-to-get-at places.

TIME by increasing speed in assembly because of the internal hex. driving feature.

THE HOLO-KROME SCREW CORP.

HARTFORD, CONN. U.S.A.



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THE TOOL ENGINEER

Volume XI

NOVEMBER, 1942

Number 11

Articles

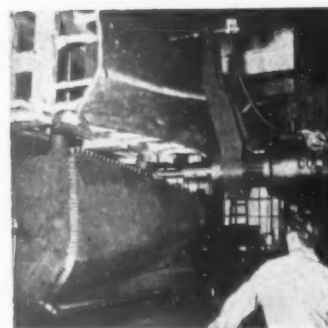
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O.W.I. Photo by Dixon
Cutting die in Frederick Coleman
and Sons, Inc., Detroit.

"Circulation of advice and short-cuts and special techniques and 'know-how' between old-time competitors clogged the wires," says E. A. Clark, telling how Detroit toolled for the war job. Read his article beginning on page 82.

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National Business Papers Assn.

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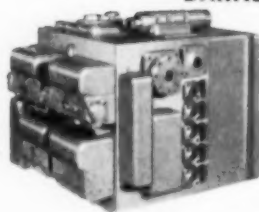
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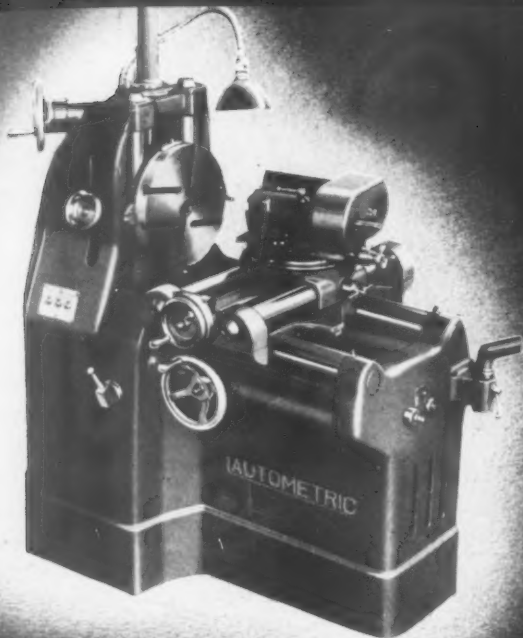
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THE TOOL ENGINEER



AUTOMETRIC

JIG BORING MACHINE

MODEL "A"

ANNOUNCEMENT . . .

THE complete line of Autometric Jig Boring Machines, formerly built by the Autometric Machine Tool Company of Berkeley, California — is now being produced by the Kearney & Trecker Products Corporation of Milwaukee, Wis.

There are three machines in the line — two horizontal and one vertical. Each is designed to handle a wide range of precision work. Speed, flexibility and extreme accuracy are hi-spot features . . . The Autometrics will have the same high-quality construction as that found in other well-known equipment designed and built by the Kearney & Trecker Products Corporation.

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AUTOMETRIC

JIG BORING MACHINE

MODEL "B"



Micromatic Anticipates Future

- ★ **1** Micromatic work holding fixtures assure **MAXIMUM EFFICIENCY** in **GENERATING FINAL SIZE, GEOMETRIC ACCURACY, SURFACE QUALITY** and **SURFACE FINISH**.
- ★ **2** Micromatic Manually Controlled Huttohones fulfill lower production needs with minimized equipment for any amount of stock removal desired.
- ★ **3** Micromatic Automatically Controlled Microhones are specific purpose tools, for stock removal usually not exceeding .003" to .004".
- ★ **4** Micromatic Hydraulically Controlled Drawfinishing Tools generate final finish with all markings co-directional with the axis of the bore.
- ★ **5** Micromatic Hydraulically Controlled Tubing Hones remove from .001" to .075" stock in bores up to 30" diameter x 75 feet long—generate accuracy within .0005" to .001".

- ★ **6** Micromatic Hydraulically Controlled Hydrohones (with or without remote control) remove from .001" stock upwards in tubing and large diesel liners—generate accuracy within .001".
- ★ **7** Micromatic Model 100 Hydrohoner with Automatic Microsize Control and Loading removes up to .002" or .003" stock in cast iron bores from ¼" to 1" diameter x 6" long—generates accuracy within .0001" to .0002" and size within .0005".
- ★ **8** Micromatic Model 200 Hydrohoner removes up to .003" or .005" stock in cast iron bores from 1" to 2" diameter x 6" long—generates accuracy within .0001" to .0003".
- ★ **9** Write for Bulletins AR-65 and AR-67.



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T-04

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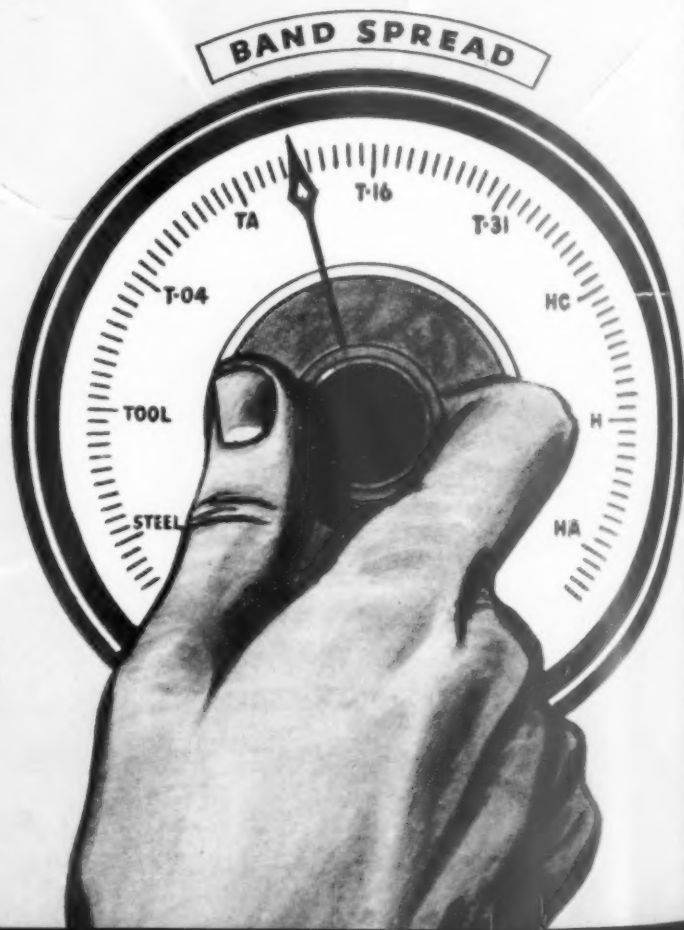
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TA

General-purpose grade for cutting steels under "average" conditions.

T-16

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FIRTHITE


SINTERED CARBIDES

for Complete Shop Tooling


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 For coarse feeds on soft materials at slow speeds, skiving brass, grooving aluminum alloys.

H

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How you can save on Diamond Wheels!

TYPICAL COMPARATIVE DIAMOND WHEEL COSTS

	Depth Diamond Section	Cost per Wheel	Number Wheels Required for Equal Service	Total Cost for Same Amount of Grinding Service	Saving Resulting from Using Thicker Section
TYPE D6W CUP WHEEL					
Diamond in Rim					
6" x 3/4" — 3/4" Rim	1/32"	\$63.55	4	\$254.20	
100 Concentration	1/8"	184.65	1	184.65	\$69.55
Same Wheel	1/16"	63.55	2	127.10	
50 Concentration	1/8"	103.90	1	103.90	23.20
TYPE D1T STRAIGHT WHEEL					
Diamond in Periphery					
6" x 1/8"	1/16"	30.05	4	120.20	
100 Concentration	1/4"	73.80	1	73.80	46.40



• The thickness of the diamond, or grinding, section of standard diamond wheels varies from $\frac{1}{32}$ to $\frac{1}{4}$ inch. Actually it is better economy to use the thicker sections wherever possible. A $\frac{1}{8}$ inch section, for instance, contains four times as many carats of diamonds as the thinnest section, and does four times the work. But the cost of one $\frac{1}{8}$ inch section is far less than its equivalent of four $\frac{1}{32}$ inch sections.

Why? Because in the first instance you pay for only *one* basic wheel shape, or "preform" and in the second you pay for four! Thus you save money by specifying the thicker diamond sections. The table above shows actual savings in a few typical cases.

By buying wheels with thicker diamond sections you save more than your *own* money. You also help conserve essential war materials and labor.

We urge you to take advantage of this saving, and thus also cooperate with us in conserving time and materials vital to our mutual war effort.

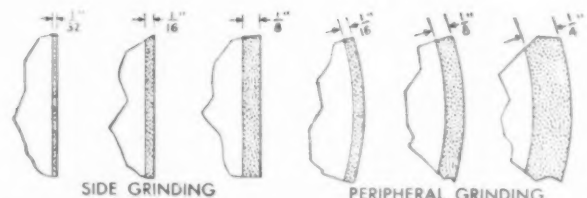


Construction of a Diamond Wheel for Side Grinding



Construction of a Diamond Wheel for Peripheral Grinding

X Dimension Shows Thickness of Diamond Section



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NAVY

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EX-CELL-O CORPORATION
1200 OAKMAN BOULEVARD • DETROIT

XLO

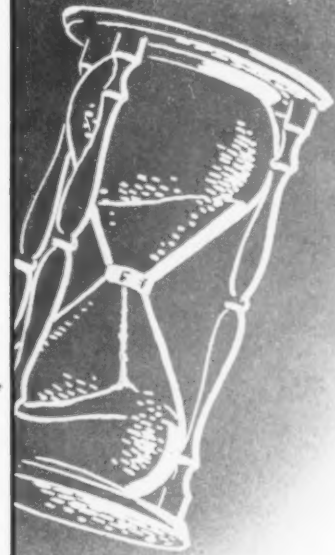
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EX-CELL-O MANUFACTURES PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DIESEL FUEL INJECTION EQUIPMENT, R. R. PINS AND BUSHINGS, DRILL JIG BUSHINGS, PRECISION PARTS

Faster with each



IT was 1844. Then, as now, the nation faced a crisis. Texas was struggling for independence. Robbins, Kendall and Lawrence, early Vermont predecessors of Jones & Lamson Machine Company, had a contract for 10,000 rifles to deliver in three years. Starting without the necessary buildings, capital or equipment for this work, they built a plant and finished the arms eighteen months ahead of time. Never before had a U. S. Government arms contract been completed so promptly.



NEARLY a century has passed since a group of Vermont machine tool builders first set a new record for fast, accurate work on a national defense contract — ninety-seven years in which these men, and three generations of their direct successors, have never ceased to set new records for rapid, accurate machine tool production — in peace as well as in emergencies.

The significant point today in this unbroken history of hard, exacting work is not alone the length of time it has been in progress, but that the rate of progress has become faster and faster with each successive year.

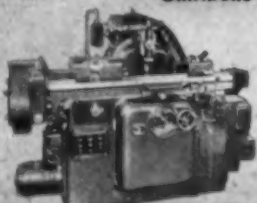
As a result, every machine in the Jones &

Lamson line is today a new machine — with more than enough speed, rigidity and useful power to take full advantage of any hard alloy tools now available or in prospect.

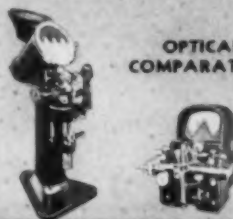
As a result, any plant with equipment and production methods planned by Jones & Lamson engineers is in strategic position to meet today's demands for wartime production and still be ready for the hard years ahead.

That is why it pays in more ways than one to put production problems up to Jones & Lamson engineers. Inquiries from large plants or small receive careful study here, and illustrated catalogs are available.

AUTOMATIC THREAD GRINDERS



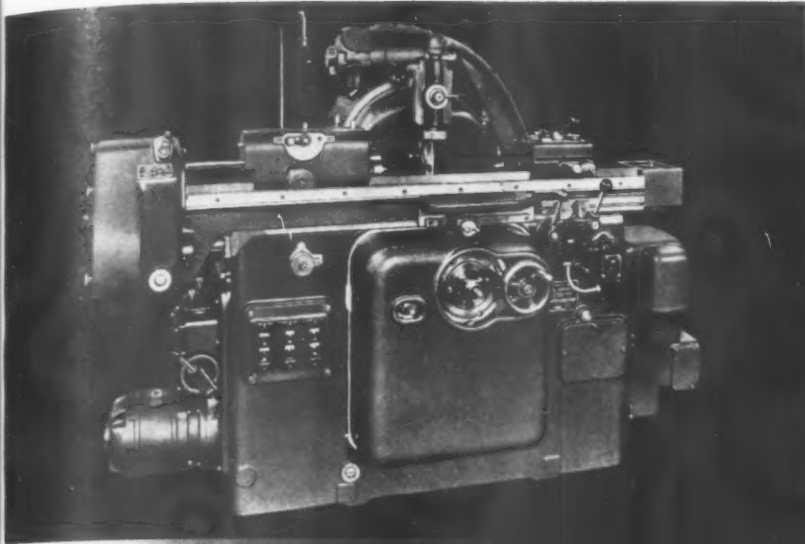
OPTICAL COMPARATORS



RAM TYPE UNIVERSAL TURRET LATHE



succeeding year!



Jones & Lamson Automatic Thread
Grinder, model TG-636 (6 x 36").



Jones & Lamson Automatic Thread Grinder, model TG-1245
(12 x 45").



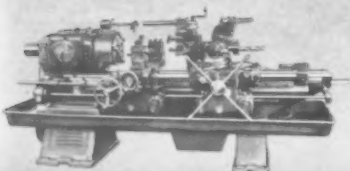
PROFIT PRODUCING
MACHINE TOOLS

JONES & LAMSON

MACHINE COMPANY - SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: RAM & SADDLE TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . AUTOMATIC OPENING THREADING DIES AND CHASERS

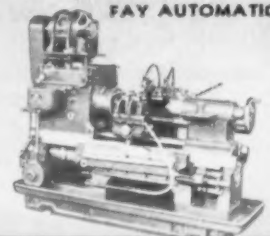
SADDLE TYPE
UNIVERSAL TURRET LATHE



AUTOMATIC OPENING
DIE HEADS



FAY AUTOMATIC LATHE



The Aviation Industry Has Turned to SUNNEN PRECISION HONING

For Speed—Accuracy—

and Super-Smooth Finish

★ Close tolerances—super-smooth finish for perfect functioning of parts, while important to other industries, are vital throughout the field of aviation.

That's why practically every leading producer of airplanes, the manufacturers of aviation instruments and controls, has adopted Sunnen Precision Honing for sizing and finishing internal cylindrical surfaces from .185" to 2.400"—quickly, accurately, and at a lower cost.

Does Not Require Skilled Labor

Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice!

This practical, inexpensive, economical machine can be set up and work located in one minute. Size adjustment can be made while machine is in motion with work on mandrel. When expensive reamers or broaches get a little undersize, many manufacturers remove the last thousandth or so with the Sunnen Precision Hone. Relieves big internal grinders for other jobs.

Corrects errors of out-of-roundness or taper caused by previous operations. Maintains alignment. Facilitates duplication of sizes.

In plant after plant, the Sunnen Precision Hone is showing production increases of 100% to 500% with corresponding savings in costs. For faster, lower-cost honing of small diameters, put Sunnen equipment to work in your plant.

SUNNEN PRODUCTS COMPANY

7932 Manchester Avenue, St. Louis, Mo. • Canadian Factory: Chatham, Ont.

SUNNEN

Typical Examples

As you can readily appreciate, we cannot publish detailed information on Sunnen "success stories." However, here are a few general examples of the type of aviation parts being handled on the Sunnen Precision Hone.



Aluminum Aircraft Link "produces high finish without bell-mouthing."



Saved time in producing a smooth, accurate finish on this bronze remote control valve body.



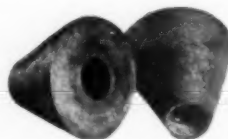
Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Aircraft Valve Tappet Roller. 4-Micro finish.



Airplane Engine Parts accurately honed to a super-smooth finish.



Cones for Wheel Balancing Machine "Accurately align honed two interrupted surfaces."



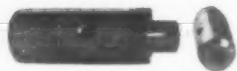
Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Drill Jig Bushing "Increases sales appeal of product."



Hardened Steel Ring Gauge—finished to an accuracy of .000025" for roundness and straightness.



Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

"we're mass-producing the tools of mass production"

Madison, Wisconsin

Dear "Admiral":

Perhaps out there at sea you often wonder what we're doing back home. Wish you could see for yourself. You'd hardly know the old place.

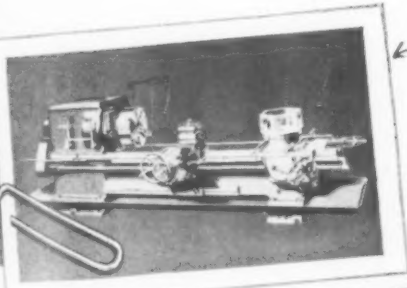
It would do your heart good to see our production line for the new "Victory" lathes. Here's a good example of the way American engineers can meet an emergency like this! Actually, you could say that we're mass-producing the tools of mass production! We're building these big turret lathes 15 times faster than our former peak capacity in these sizes!

How'd we manage to do it? Maybe the censors wouldn't like to have us put the whole story in writing. But take our word for it, there'll be no "aid and comfort" for the enemy in the number of them that are going to work in vital war plants!

One thing you can count on: this country is going to out-produce the Axis by a wide margin. We're "all out" to end this war as soon as possible. And when it's over, we hope you can be as proud of the home folks as they are of you.

Salutes!

The fellows at Gisholt—



These new Victory lathes are big Saddle Type machines: Two sizes: 21" and 24" chucks; 5 1/4" and 9 1/4" spindle bores.

THIS letter may be good news to any man in the fighting forces. But it's even more to the point for the man trying to increase production capacity in vital war plants.



190 SURFACE FEET PER MINUTE WITH **GRAPH-MO** *Steel*

Mr. H. F. Braun, General Manager of The Taylor Precision Manufacturing Company, reports that his operators are machining Graph-Mo Steel for small arm punches at speeds as high as 190 surface feet per minute with .012" feed and .030" cut. These tools are heat-treated and used at hardnesses up to Rockwell C 65 on the working ends.

This northern Ohio manufacturer says that Graphitic Steel machines 25% faster than carbon tool steel, is less subject to distortion, provides an excellent finish after grinding, and wears longer.

For further information on Graphitic Steels, write on your company's letterhead and ask for a copy of "The Graphitic Defense Handbook".

War or Peace
...the advantages
are the same...longer
wear, easier machin-
ing...that's Gra-
phitic Steel.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division

HELP ASSURE VICTORY

Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel.
Use the Telephone Only When Important. Salvage All Scrap
and Waste Material.

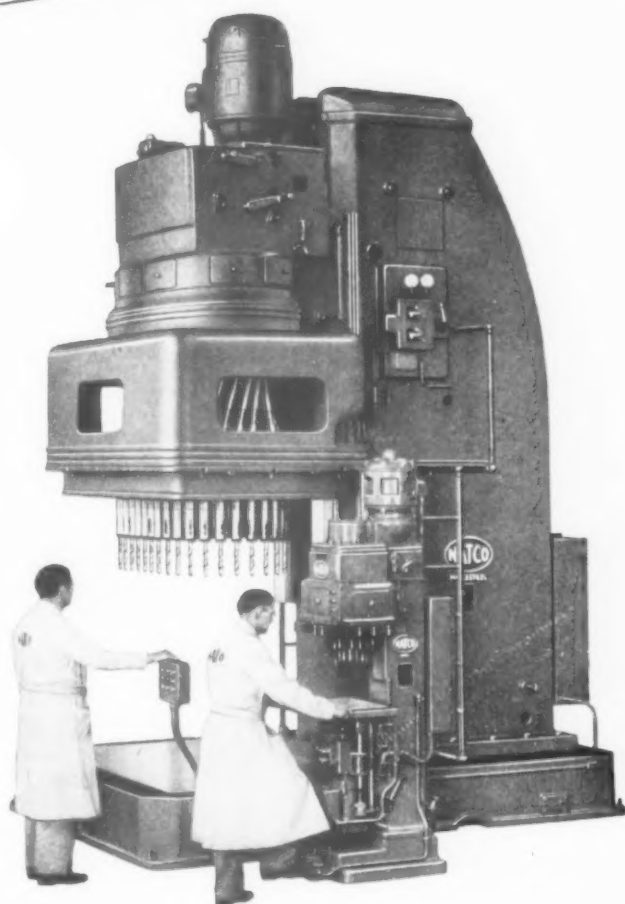
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
GRAPHITIC STEELS

THE TOOL ENGINEER



For excellence of performance in the production of machine tools, the NATIONAL AUTOMATIC TOOL CO., INC., has been awarded the ARMY-NAVY "E" BURGEER.

We at NATCO accept this honor as a challenge to better the ever increasing rate of production and to maintain our high standard of quality . . . a standard that has made NATCO a recognized leader in the machine tool industry.

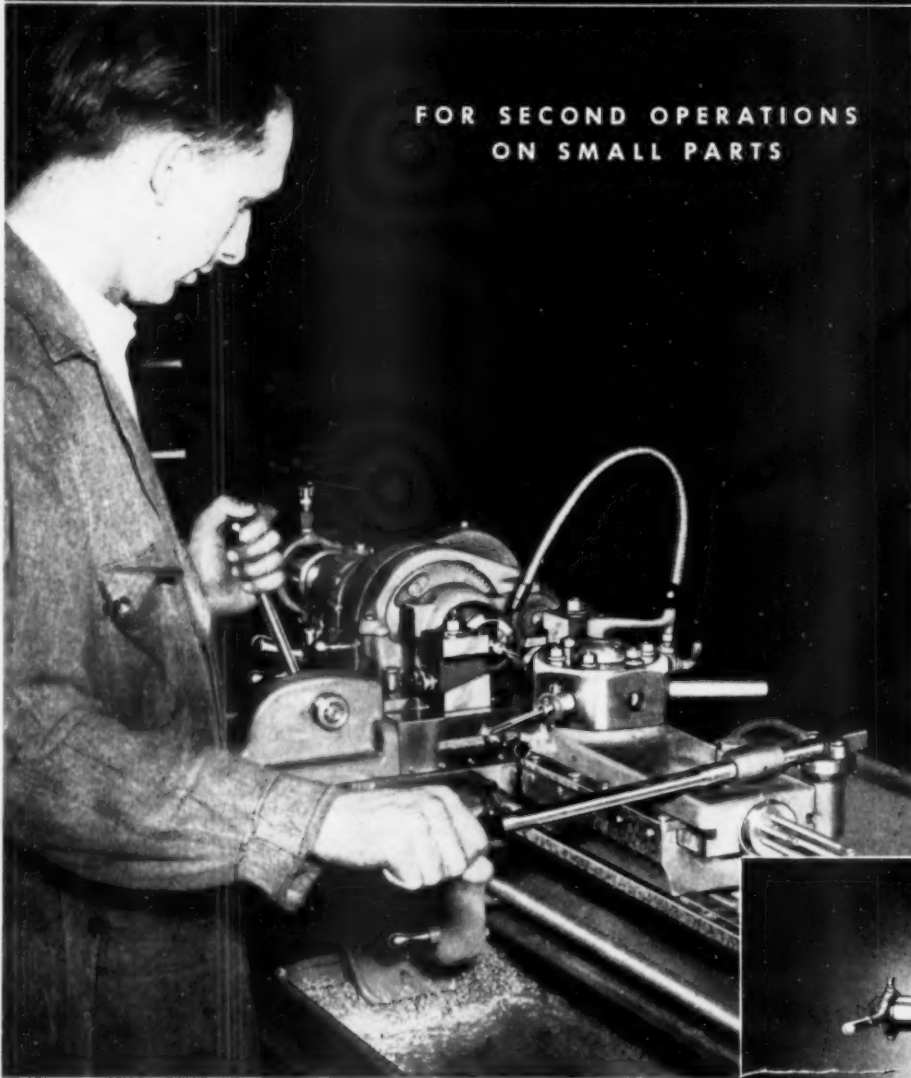


NATIONAL AUTOMATIC TOOL COMPANY, INC.

RICHMOND, INDIANA, U. S. A.

DRILLING, BORING and TAPPING MACHINES

New SOUTH BEND TURRET LATHES



FOR SECOND OPERATIONS
ON SMALL PARTS

Designed for the rapid machining of small duplicate parts, the new Series 1000 South Bend Turret Lathes are especially adaptable to second operation work. Their speed, accuracy and versatility make possible rapid production without sacrificing efficiency or precision.

Features that contribute to the versatility and efficiency of these lathes are the smoothly operating handlever bed turret, the handlever cross slide with double tool blocks, the compound cross slide with power longitudinal feeds and power cross feeds for the universal carriage, forty-eight precision thread cutting feeds driven by a lead screw, and a wide range of spindle speeds.

The handlever bed turret indexes automatically on the return stroke and is equipped with an adjustable feed stop for each face. The handlever cross slide has adjustable stops for both the front and back tool blocks. Standard extras simplify tooling this lathe for war production and make it easily convertible to other work when peace comes.

Series 1000 Turret Lathes

The Series 1000 Turret Lathes have a $1\frac{3}{8}$ " spindle hole, $10\frac{1}{2}$ " swing over bed, and 1" maximum collet capacity. They are made in bench and floor types—with or without coolant equipment. Standard equipment includes quick change gear box, power feed universal carriage, handlever cross slide, compound rest cross slide, and handlever bed turret. Standard extras (not included in prices of lathes) include 4-way turret tool block, tailstock, collet attachment, taper attachment, thread dial indicator, and micrometer carriage stop. Write for Bulletins 1002 and 1004 which contain complete information and specifications.



SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA

Lathe Builders for 35 Years





WASTING TIME.

DOES THIS HAPPEN IN YOUR DRAFTING ROOM?

These draftsmen are busy making changes in the design of a fighter plane . . . and there isn't a day dream in the crowd. But they are wasting time—valuable time which could be saved with the Ozalid Process.

With an Ozalid whiteprint machine they could make transparent prints of the original drawings . . . apply Ozalid Corrector Fluid to the obsolete lines and then draw in the new designs. Thus, they could have new "originals" without tedious retracing . . . without the wasteful tie-ups encountered in altering Van Dykes.

Ozalid transparent and standard whiteprints are produced in two quick steps—Exposure and Dry Development. And because of DRY DEVELOPMENT—an Ozalid whiteprint machine is radically different from blue print equipment which requires liquid baths, driers, permanent plumbing connections and much floor space.

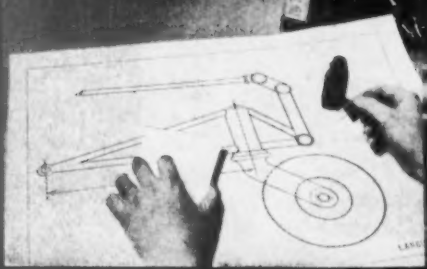
Ozalid's wide variety of sensitized materials may be used in the whiteprint machines built for major, medium or small print production—thus, everyone can produce prints on foil, cloth, or air mail weight paper—prints which will have blue, black, maroon or sepia lines on a white background.

If you are not already using the Ozalid Process . . . but are changing the design of your drawings . . . you are wasting time and labor. Save these essentials in war production!

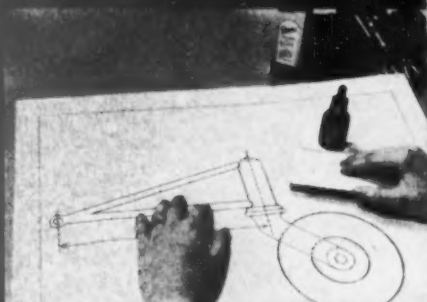
Write for new catalog "Simplified Printmaking" which explains all the advantages of the Ozalid Process.

SPECIFY **Ozalid**
WHITEPRINTS

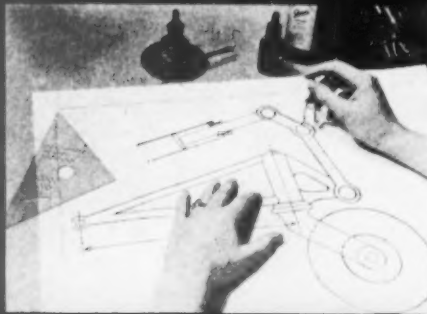
OZALID PRODUCTS DIVISION
GENERAL ANILINE & FILM CORPORATION
JOHNSON CITY, N. Y.
OZALID IN CANADA: BIRCHMOUNT QUEBEC CO. LTD. MONTREAL



This is an Ozalid transparent print of an original tracing. The draftsman is applying corrector fluid to that part of the design which is to be changed.



The lines are quickly eradicated . . . and the print is dried with a desk blotter. Only that part which will be the same in the "new" design remains.



The changes are drawn in . . . and a "new" original is ready to produce subsequent prints.



OZALID MODEL "F"

How BARNES "Know-How" Helped Keep Our Ship Program Ahead of Schedule!



CALL YOUR DISTRIBUTOR

Today your surest, quickest, most complete service for practically any staple industrial product is to be had from your Mill Supplies Distributor. Make a habit of calling him *first* when you need anything. And don't forget to ask for Barnes Blades with your next order.

A Barnes Blade is Better

A famous old Eastern shipyard was cutting six-inch bronze on an old-type machine. For years saw life had been getting progressively worse on this job until, when the Barnes man was finally called in, blades were lasting only 12 minutes.

The Barnes man pointed out that bronze alloy specifications have been growing harder in recent years. He advised transferring the work to a newer machine, while reserving the old one for aluminum. Blades now last about eight hours.

Making blades *work* is as important to Barnes as making them well. Barnes blades are recognized in industry for their uniformity.

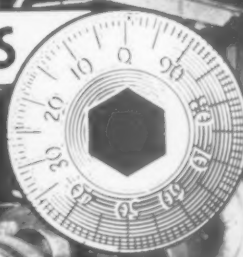
W. D. BARNES CO. INC.
DETROIT MICHIGAN

PRODUCTION FOR VICTORY!

That's our job and your job. Let's
dedicate ourselves to the
single purpose of produc-
ing enough planes,
ships and guns to
Win this War!

DAVIS BORING
TOOL DIVISION
LARKIN PACKER CO., INC.
ST. LOUIS, U. S. A.

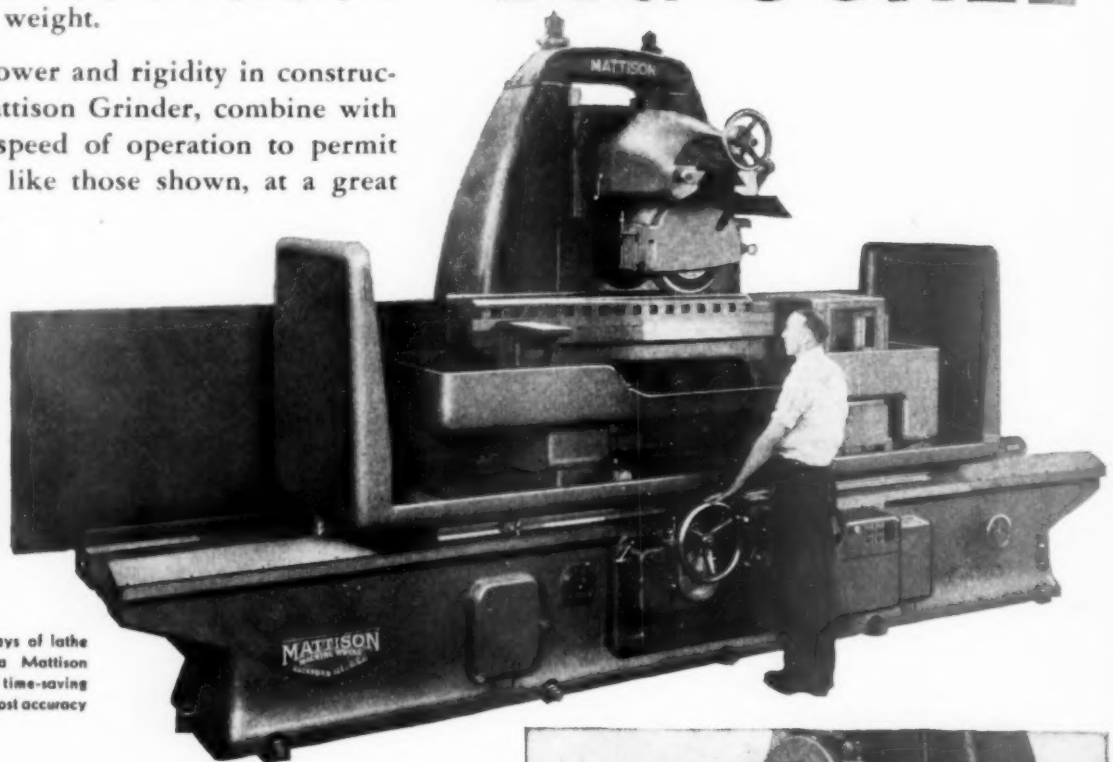
BORING TOOLS



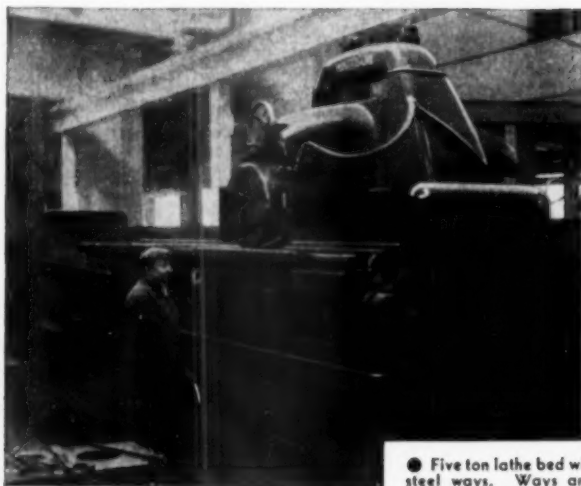
Precision Surface Grinding on a **BIG SCALE**

Mattison Surface Grinders are providing a fast, economical and exceedingly accurate method for finishing parts weighing up to several tons in weight.

The High-Power and rigidity in construction of the Mattison Grinder, combine with accuracy and speed of operation to permit handling jobs like those shown, at a great saving of time.



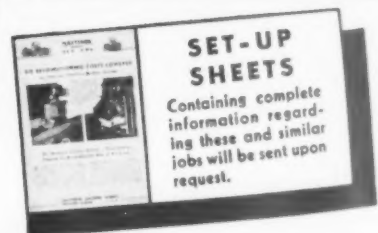
● V-shaped and flat ways of lathe bed being ground on a Mattison Grinder. A practical and time-saving method for grinding to utmost accuracy and smooth finish.



● Five ton lathe bed with hardened steel ways. Ways and heads of hold down bolts ground complete in one setting. Time is saved; a more accurate job is obtained.



● Three ton heading slide previously hand scraped — now ground in 62% less time. A fine finish and close accuracy is secured with no scraping necessary.



MATTISON

MACHINE WORKS

ROCKFORD • ILLINOIS

ARMY

E

NAVY

Proudly it flies

SYMBOL OF A PLEDGE UPHELD

TODAY, from the flagstaff of the Thor plant in Aurora, Illinois there flies the "E" Banner representative of the joint Army-Navy Production Award, signifying excellence on both Army and Navy production.

And, proudly, Thor employees wear the "E" lapel pin.

Fully aware is every man and woman of Thor of the significance of the honor which has come to them. They regard it, humbly, as the symbol of a pledge upheld.

* * *

MONTHS ago, the men and women of Thor gathered in the shadow of the plant and made a pledge.

The pledge was, "We'll Produce the Plus."

It was a pledge made solemnly by determined people who knew that the portable power tools they make would help to build the planes, the tanks and the ships with which the war must be won.

Months ago, they rejected the thought that "Too little, too late" could be applied here.

That's why shipments leaving the plant have doubled, then doubled again . . . have

resulted in more tools produced than anyone ever thought possible.

In our own way . . . in the only way we know how . . . we have added our part to the industrial effort that is so necessary for the fighting of battles wherever conflict rages.

For this reason, we look upon the award of the Army-Navy "E" as symbolic of a pledge upheld.

* * *

To you, the users of Thor tools, we report this conferring of the Army-Navy "E" with the stern realization that our task is just begun.

*Not while a plane is delayed in its departure,
not while a ship lies waiting on the ways,
not while a needed shell is uncompleted,
can there be any feeling of satisfaction or accomplishment.*

Today, with even greater determination, we reaffirm our purpose and now pledge . . .

"We'll Exceed the Need!"

Thor

Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY



600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

• GRINDERS • HAMMERS • SAWS • NIBBLERS • SCREW DRIVERS • POLISHERS • SANDERS • NUT SETTERS

more work at higher speeds on less floor space! DALZENS DO IT!



DALZEN No. 1 THREAD GRINDER

The DALZEN No. 1 Thread Grinder will grind threads up to ten inches in length anywhere on an eighteen inch shaft with a diameter maximum of six inches.

48" WIDE 38" DEEP 75" HIGH



**DALZEN No. 2
THREAD GRINDER**

The DALZEN No. 2 Thread Grinder grinds threads up to four inches in length anywhere on an eight inch shaft with a diameter maximum of three inches.

43" WIDE 39" DEEP 72" HIGH



BROACHES AND TAPS

Shown below are some of the broaches and taps manufactured by DALZEN. The broaches are made in rounds, flats, or form. The taps are Whitworth and British Association form.



**DALZEN
TOOL &
MFG. CO.**

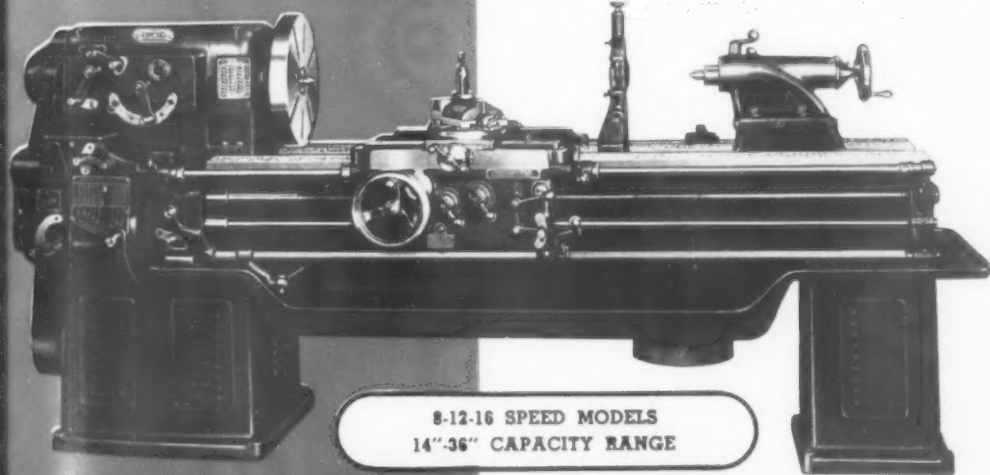
Write
for latest
Bulletins

12255 E. 8-MILE ROAD
DETROIT, MICHIGAN

Sidney Lathes

★ Today you must consider machine tools that are designed and built for 24 hour service 7 days a week. Sidney lathe users are in an excellent position to meet the unusual demands now placed on them by the National Emergency.

SIDNEY
THE SIDNEY MACHINE TOOL CO., SIDNEY, OHIO, U.S.A.



The SIDNEY MACHINE TOOL Company
Builders of Precision Machinery

OHIO



Helping other Manufacturers in a pinch makes it easier for your Distributor to help You!

Have you ever benefitted by some resourceful Distributor's *borrowing* of tools or supplies that neither he nor you had in stock on a particular day?

Knowing his territory as he does, the Distributor usually knows what manufacturer has a temporary surplus of what—and can spare a supply until the stock can be replenished.

You *always* need your Industrial Distributor—not just as a telephone number or street address, but as Chief Headache Absorber for your Purchasing-Expediting Department.

Your Distributor is trained to give you a hand on Priorities, too.

Draw on his experience for obtaining the supplies you need. It certainly will be the exception if you don't meet men of your own measure—in fact we are sure they *will* be.

These same Mill Supply Houses have served for many years as this Company's Distributors of Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.



Awarded May 22, 1942
Superseded July 13, 1942

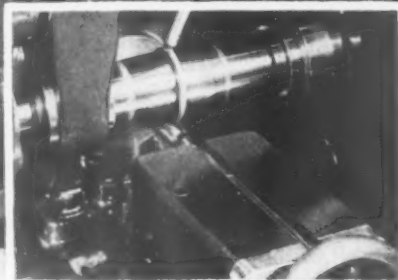
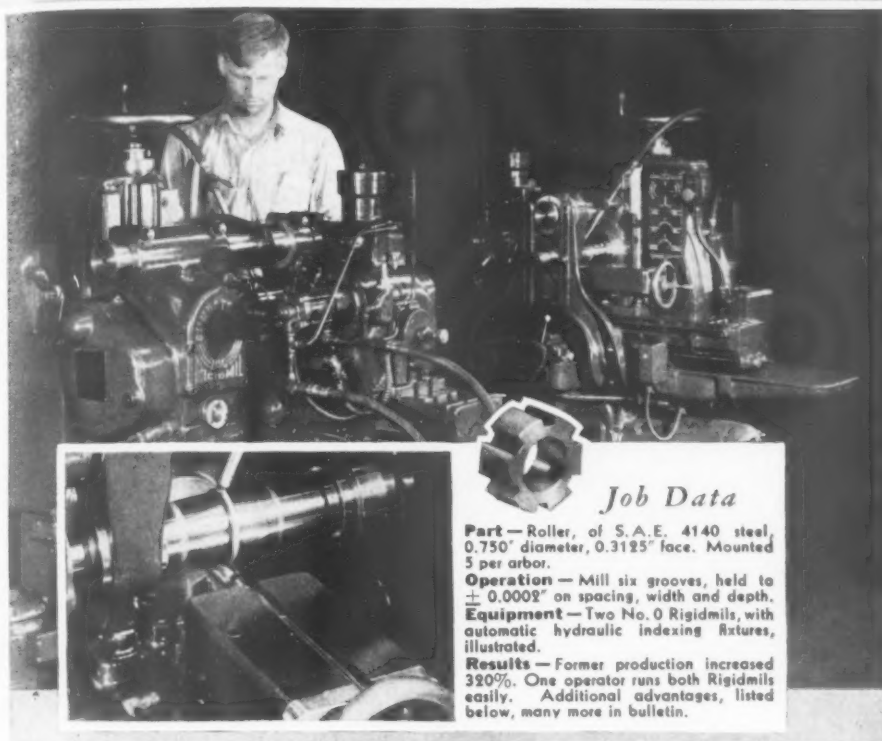
The **CLEVELAND** TWIST DRILL
COMPANY
1242 EAST 49th STREET
CLEVELAND
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES
30 READE ST. NEW YORK 9 NORTH JEFFERSON ST. CHICAGO 650 HOWARD ST. SAN FRANCISCO
6315 SECOND BLVD. DETROIT LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST. E.C.4



Awarded August 8, 1942
★

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

Engineered Production



Job Data

Part—Roller, of S.A.E. 4140 steel, 0.750" diameter, 0.3125" face. Mounted 5 per arbor.

Operation—Mill six grooves, held to ± 0.0002 " on spacing, width and depth.

Equipment—Two No. 0 Rigidmils, with automatic hydraulic indexing fixtures, illustrated.

Results—Former production increased 320%. One operator runs both Rigidmils easily. Additional advantages, listed below, many more in bulletin.

Hydraulic RIGIDMILS Increase Operator Output 320% Hold Accuracy to $\pm .0002$ "

For milling six grooves in steel pump rollers as shown above Sundstrand Engineered Production and two No. 0 Hydraulic Rigidmils with automatic hydraulic index fixtures increases operator output 320%. What's more, the close limit of $\pm .0002$ " to which this milling operation must be held is more easily maintained because of "built-in" accuracy in Sundstrand Rigidmils and fixtures and the complete automatic cycle which they provide.

Continuous Automatic Cycle—The whole operation of milling 6 grooves in an arbor-load of 5 work-pieces continues automatically after starting. It includes rapid approach, feed, quick return, index, repeat 5 times, and then stop.

Repeated Accuracy—Spacing, width, and depth of cuts maintained mechanically by accuracy built into the Rigidmils and fixtures. Automatic cycle eliminates human element, assures duplication of accurately milled parts throughout run.

Saves Skilled Labor—Operator now merely loads arbor with blank parts and starts full automatic cycle. Six complete table cycles and 5 indexes of fixture are automatic without further attention. One operator easily runs two Rigidmils to produce more parts than he was able to before, with less effort.

Cuts Checking Time—Automatic hydraulic indexing, and Rigidmil accuracy, cut checking time to routine inspection at start of a run, and occasional examination for cutter wear.

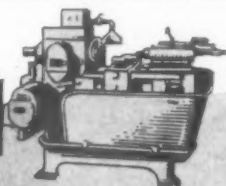
Reduces Rejects—Rigid mechanical control of accuracy, assures perfect product, reduces rejects and spoilage.

Other Uses—These Rigidmils can be applied easily to many different milling jobs simply by substituting other fixtures and cutters. See Bulletin 806 for details. Ask about other Rigidmils. Consult our Engineered Production Department about new equipment for any milling operation.

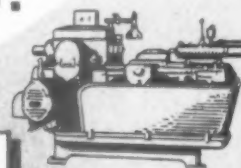
Sundstrand Machine Tool Co.

2532 Eleventh Street, Rockford, Illinois, U. S. A.

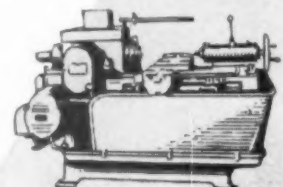
Model 8
Automatic
Stub Lathe



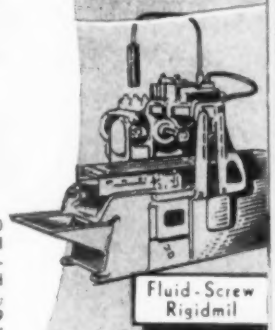
Model 10
Automatic
Stub Lathe



Model 12
Automatic
Stub Lathe



Fluid-Screw
Rigidmil



Get NEW
Bulletin



New bulletin on No. 0 Rigidmil illustrates and describes impressive production-increasing and labor-saving operations; shows 26 features, 9 cycles, specifications and other data. Get your copy, today. Write now for Bulletin 806.

In their respective fields, Sundstrand machine tools are unexcelled for high production, accuracy, and lasting value. Write for complete details.



RIGIDMILS · STUB LATHES

Hydraulic Operating Equipment — Drilling and Centering Machines



5-METHOD

COMPLETE TOOL SERVICE for MAXIMUM PRODUCTION

*You Grind the Tools You Need
from Milled and Brazed Tools*



A few typical
Milled & Brazed Tools

Milled and brazed tools are meeting with great favor among users of carbide tools. You can select general purpose grades of Ramet Tantalum-tungsten carbide or special purpose grades, depending upon your requirements, and have them brazed to almost any shape of shank. Thus a wide variety of boring, turning, and facing operations on cast iron, steels, and other materials with a minimum tool inventory. A milled and brazed tool is taken from the tool crib and ground to suit particular requirements. Usually a finish ground tool ready to use can be had in less than a half hour. With a little planning, jobs can be tooled with carbide tools in a very short time.

Milled and Brazed Tools is another method of Vascoloy-Ramet Tool Service for tooling for maximum production. Perhaps it is the best method for you. Perhaps it is the best for some of your requirements. This class of tools, especially when ordered in quantities, offer economy and delivery advantages that merit their consideration by both large and small users of carbide tipped tools.

Ramet
VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS
DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES
IN CANADA: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

4265

TANTALUM-TUNGSTEN CARBIDE
FOR TOOL SERVICE..... Specify  **TOOLS**
TANTUNG "G"

FOR MAKING STUDS—Caterpillar TRACTOR CO.
REG. U.S. PAT. OFF.
MEETS PRODUCTION DEMANDS TODAY... WITH A
HOPPER-FEED *Model 'B'* CLEVELAND AUTOMATIC



• Lots of 6000 S.A.E. 1035 studs are produced from heat treated bar stock on this new Model B Cleveland Automatic of 1½-inch capacity, in a mid-western plant of the Caterpillar Tractor Co. • Operations on this stud are exceedingly simple for Model B. Bar stock, ½-inch diameter, is fed to gauge, and a coarse thread is cut ½-inch long, and stock is cut off. Pieces are then placed in hopper and gravity-fed to return through the spindle for the second operation, the cutting of a ⅞-inch long fine thread. • Maybe a Model B Cleveland can simplify and speed up your production. A Bulletin describing it fully will be sent on request.

THE CLEVELAND AUTOMATIC MACHINE COMPANY
2269 ASHLAND ROAD, CLEVELAND, OHIO

Sales Offices at:

Chicago, 568 W. Washington Street • Detroit, 840 New Center Bldg.
Newark, 702 American Insurance Bldg. • Cincinnati, 807 American Bldg.

CLEVELAND
Single Spindle
AUTOMATICS

MIDWEST TAPER AND PIN DRIVE TYPE END MILLS

*permit maximum
SPEEDS AND FEEDS*

MIDWEST END MILL
Taper and Pin Drive
makes tool changes
possible in mini-
mum time

END MILL HOLDER
gives perfect
alignment to
operation — no
loose parts easily
dislocated or lost

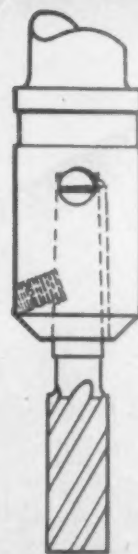


THESE HIGH PRODUCTION TOOLS OFFER THE POSSIBILITY OF INCREASING YOUR PRODUCTION

Midwest End Mills are made with a high helix angle (fast spiral) to provide maximum speed in action, and with plenty of chip room to prevent clogging of chips in the flutes.

The Midwest Taper and Pin Drive tool holder has a round pin partially imbedded in the wall. A corresponding keyway in the tapered shank of the end mill fits this pin. As a result full driving energy is exerted along the entire length of the end mill shank. A safety lock screw holds the shank firmly in place. The drive is positive, rigid and always perfectly aligned.

These features in Midwest Pin Drive End Mills permit higher speeds and feeds; they result in greater production, more accurate work and exceptionally high finishes in milling operations.



ASSEMBLY VIEW
showing Midwest Pin Drive
with safety lock screw



MIDWEST

Precision METAL CUTTING TOOLS

END MILLS • SLEEVES
• COUNTERBORES •
SPECIAL TOOLS • DRILLS
REAMERS • FORM TOOLS
CARBIDE TIPPED TOOLS
ADJUSTABLE HOLDERS

MIDWEST TOOL & MFG. CO. • 2364 W. JEFFERSON AVE. • DETROIT, MICHIGAN

Your Engineering Branch in Worcester

HEALD FACTORY SERVICE

2. Production will beat the Axis — but we've got to work fast. Every minute counts, and all those non-productive minutes spent on production problems add up to hours irretrievably lost. Valuable time could be saved by a staff of experts capable of solving machining problems quickly. Such men are scarce but nevertheless are available, immediately, if your problem involves precision boring and grinding — thru Heald Factory Service. This service provides both the engineers and the know-how needed to get stalled jobs rolling. To get Heald Factory Service Engineers on the job simply give us your problem with complete details. Chances are their specialized knowledge of every phase of precision finishing will produce a speedy solution. Useful, too, are quick delivery of repair parts provided by Heald Factory Service, the Heald school for training your men to operate Heald machines, the parts catalogs and instruction manuals available. All in all, this gives you an invaluable engineering branch in Worcester — worth using, worth consulting. Let's have your problem — write, phone or wire us today.



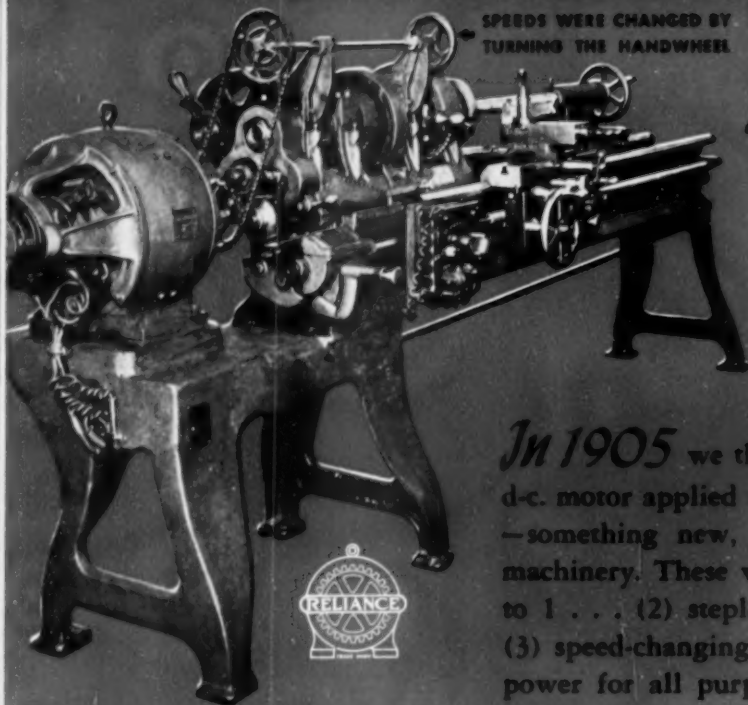
BORING ENGINEERING DEPARTMENT

Here are a few of our 250 engineers ready to tackle your problem.

Heald 3 POINT SERVICE *Keeps Production Rolling*

1. Field Engineering Service
2. Factory Engineering Service
3. Demonstration and Maintenance Service

THE HEALD MACHINE CO. WORCESTER, MASS., U. S. A.
MANUFACTURERS OF PRECISION BORING AND PRECISION GRINDING MACHINES



New in 1905..

Armature-shifting Design
RELIANCE ADJUSTABLE-SPEED MOTOR
for D-c. Circuits

In 1905 we thought this was "the berries"—our armature-shifting d-c. motor applied to a lathe. The motor, Type AS, was our first product—something new, providing distinct advantages for motor-driven machinery. These were outstanding features: (1) speed ranges up to 10 to 1 . . . (2) stepless speed control between high and low limits . . . (3) speed-changing separate from starting and stopping . . . (4) ample power for all purposes.

After 37 years of showing how motor-drive can be made a part of the production process, we are still digging up new ideas and developing new equipment to put them to use.

1905 MODEL 16" LATHE WITH
400-2000 RPM. RELIANCE
ADJUSTABLE-SPEED MOTOR OF
ARMATURE-SHIFTING DESIGN

New in 1942..

The Latest. This new all-electric precision lathe is the work of designers who recognized that motor-drive can be a lot more than power. They designed around the electric motor making use of the Reliance V*S All-electric Adjustable-speed Drive. Here's what they have:

A lathe giving spindle speeds from 5 to 2500 rpm. with but one gear change... All electrical equipment is built-in and arranged for connection to an a-c. circuit... Speed changes at the turn of a handle (1) on the headstock... Spindle speeds indicated by a tachometer (2)... Spindle operation (starting, stopping, reversing), all controlled through the motor by a small switch on the headstock (3).

The Reliance V*S All-electric Drive is more than a source of power. It provides speed control for spindle or table and for feed drives. It replaces change gears and reversing gears, brakes, and clutches. It makes it easy to produce more. We shall be glad to help in adapting it to your machines or processes.

RELIANCE ELECTRIC & ENGINEERING CO.

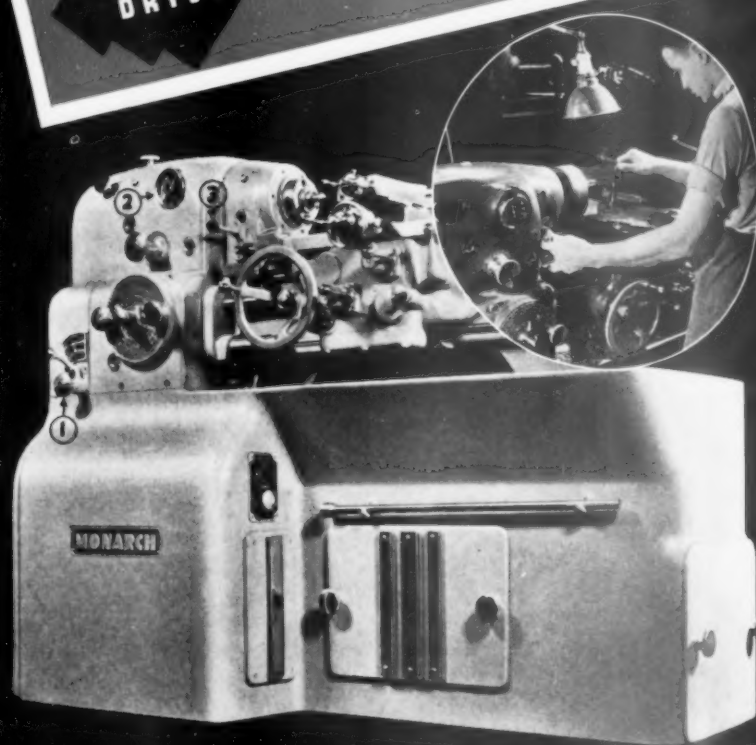
1088 IVANHOE ROAD • CLEVELAND, OHIO

BIRMINGHAM • BOSTON • BUFFALO • CHICAGO • CINCINNATI • DETROIT
GREENVILLE S C • HOUSTON, TEXAS • LOS ANGELES • MINNEAPOLIS
NEW YORK • PHILADELPHIA • PITTSBURGH • PORTLAND, ORE • ST LOUIS
SAN FRANCISCO • SYRACUSE, N. Y. • AND OTHER PRINCIPAL CITIES

GET OUR BULLETIN No. 310 FOR
DETAILS OF THE RELIANCE V*S DRIVE

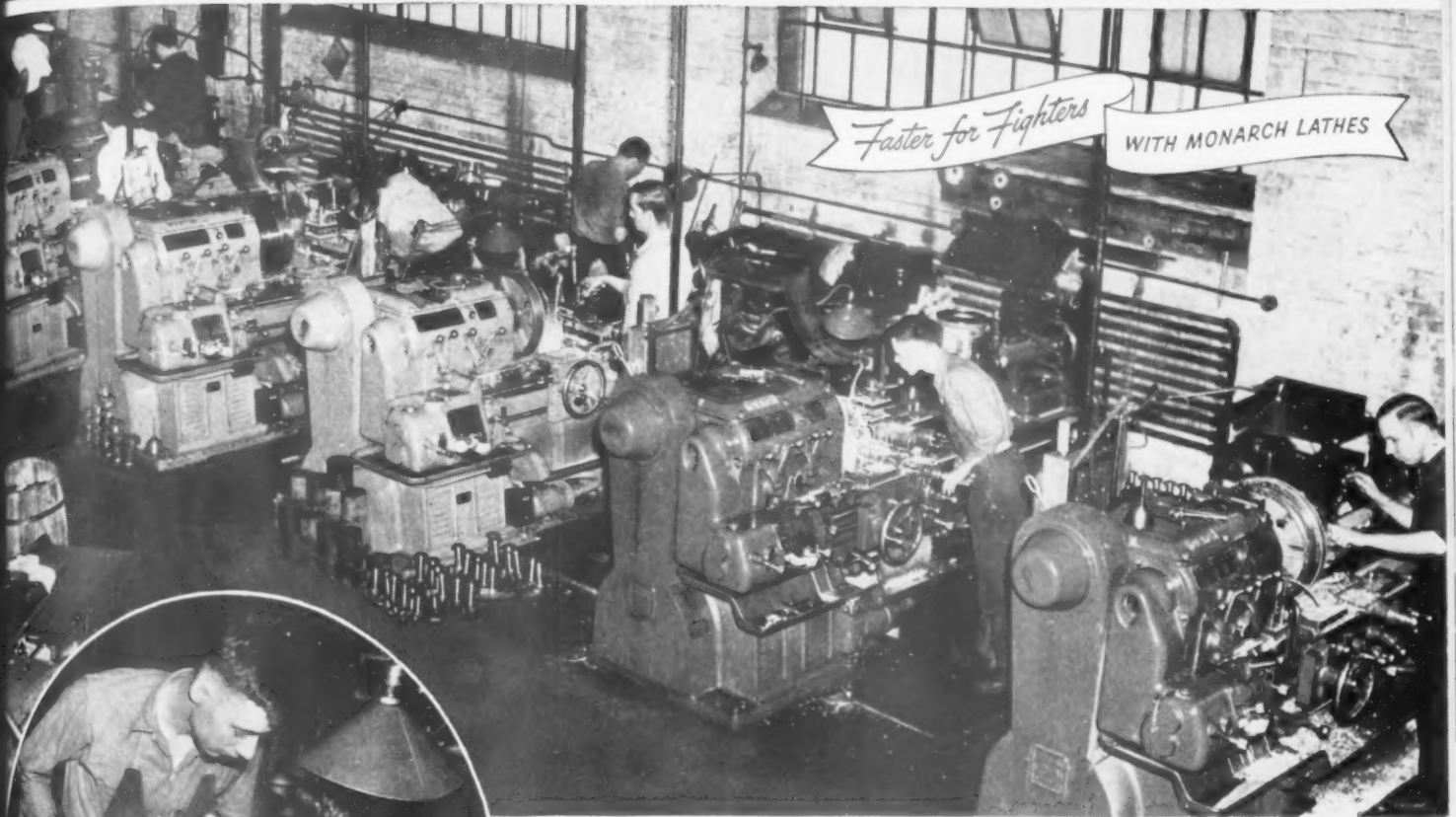
RELIANCE
VOS
DRIVE

AN ALL-ELECTRIC
ADJUSTABLE-SPEED DRIVE
FOR A-C. CIRCUITS
Speed Ranges up to 16 to 1
Sizes 1 to 30 Hp.



RELIANCE ^{A-C} _{D-C} **MOTORS**

Precious minutes saved!



Unit saving and production increase of dogs for armored doors are multiplied by this battery of Monarch lathes.

Taking advantage of the versatility of Monarch lathes, this producer of dogs for armored doors and hatches on conning towers has reduced machining time to less than one-half the former schedule.

About half the previous time was devoted to facing and counterboring—now accomplished more than twice as fast on a Monarch lathe. Facing the dogging surface absorbed the other half of the finishing time—now done on a Monarch with an interrupted cut in 60% of the previous time. Thus Monarch does both jobs in less time than previously was required for either one.

A double advantage is thus gained. More pieces produced per hour, and machine tools released for other work.

Today, when every production minute saved is precious, and when every machine tool is so urgently needed, this example will help other plants produce faster for fighters.

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO

MONARCH



LATHES

COVER THE TURNING FIELD

"LOGAN"



AIR-DRAULIC CYLINDER

★ As Applied To A STANDARD No. 4 SHELL BANDER

The automatic feeding device on this Standard Shell Bander, manufactured by Standard Machinery Company, of Providence, R. I., is operated by a "LOGAN" Air-Draulic Cylinder. A "LOGAN" Air-Draulic Cylinder uses air pressure as a power means and oil as a regulating means, combining the speed of an air

cylinder with the smooth, steady cushioning action of a hydraulic cylinder. A "LOGAN" Model "TL" Valve controls the action of the "LOGAN" Air-Draulic Cylinder. Let "LOGAN" Representatives and Engineers make recommendations on your problems, or write for "LOGAN" Air-Draulic Cylinder Bulletin 470.

★ **LOGANSPORT MACHINE, INCORPORATED** ★

902 PAYSON ROAD

LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

Duplicate parts for

AIRPLANES

AIRPLANE ENGINES

TANKS

BOFORS GUNS

90 mm. ANTI-AIRCRAFT GUNS

ADAPTORS FOR SHELLS

AMERICAN COERLIKON GUNS

are being produced on

AUTOMATIC
CHUCKING
EQUIPMENT

in the Arsenals of Democracy

Full speed ahead—the order of the day—is an obligation and a responsibility resting squarely on the shoulders of metal working plants.

Potter & Johnston Chucking Equipment is helping these plants meet the difficult schedules which are involved in the production of urgent war needs. Demands

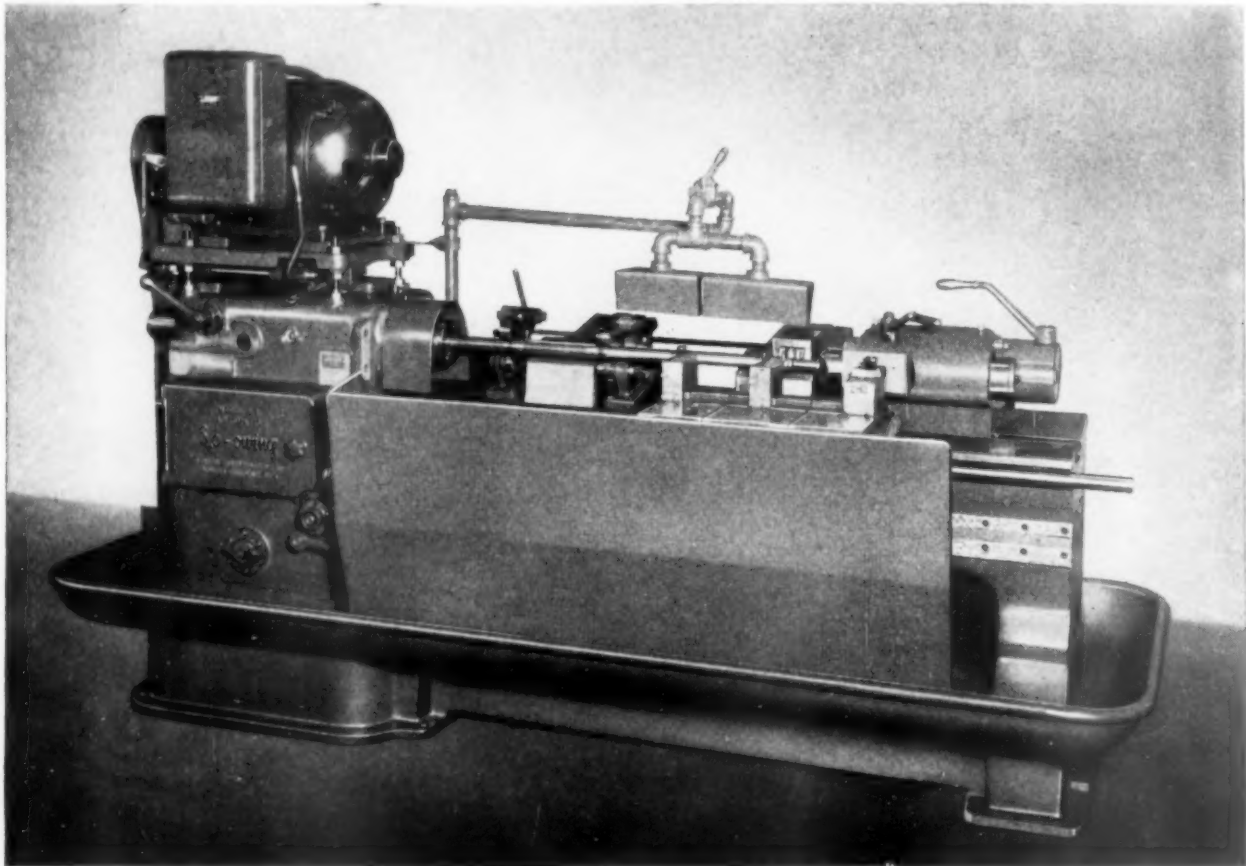
for increased production have brought many opportunities to the attention of P&J engineers. Long experience and versatility of tooling have made it possible for P&J to render invaluable assistance.

Potter & Johnston is glad to be able to do so much to help speed the Allied war effort.

The POTTER & JOHNSTON MACHINE CO.
AWTUCKET RHODE ISLAND

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

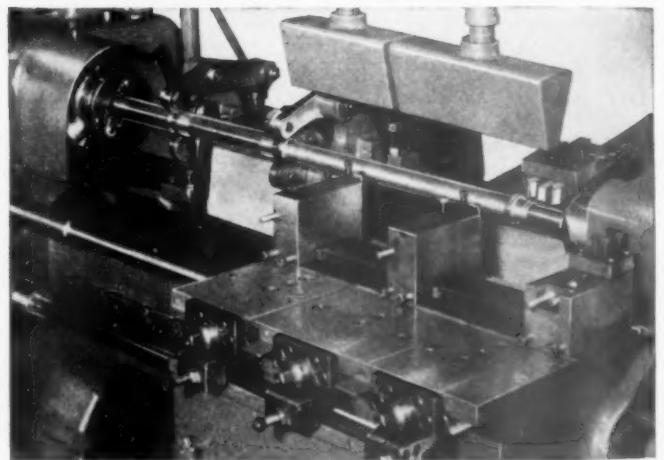


MODEL LR Lo-swing LATHE EQUIPPED FOR TURNING LONG, SLENDER SHAFTS

Problem: To provide a fully automatic Lathe capable of turning long, slender tubes with sintered carbide tools.

Solution: In order to reduce the number of tools in contact with the work to a minimum and thus avoid distortion of the tube, this job required a machine with a specially long carriage feed.

A Model LR Lo-swing was selected for this job and equipped with a special longitudinal feed attachment permitting a maximum carriage travel of 9" which was in excess of that required for this job. The tube is held between centers and driven with a Seneca Falls Automatic Driver which assures a positive balanced drive and also prevents distortion. The work is supported with two-roller steady rests, the rolls of which are in contact with two ground spottings. One-half of the shaft is turned as shown in illustration, after which the shaft is reversed and the opposite end turned.



Another feature of this machine is the three slide carriage having independently cam-controlled slides operated through the Seneca Falls SIMPLIFIED CHANGE-OVER MECHANISM. Each slide may be set for different lengths of cuts by a simple adjustment of gear segments which are fitted with graduated scales corresponding to desired length of cut in inches.

The Model LR Lo-swing Lathe is completely automatic; the operator simply loads and unloads the work and pulls the starting handle.

LATHE NEWS from SENECA FALLS

If no two men have the same sense of touch— **NEITHER HAVE FOUR**



6-12 A.M.

Al's touch is tense and not always acute; it's a bit erratic.



12-6 P.M.

George works by "main strength". His touch is not sensitive.



6-12 P.M.

Bill really has a sensitive touch — except when he has a hangover.



12-6 A.M.

Massey is a human gage. But, he works only one out of four shifts.

but . . . the quality of their inspection should not be influenced by the hours of their shift, their various nervous temperaments, their physical condition, or their general experience. And that will not do today.

Precision inspection of linear dimensions requires uniform, impersonal inspection. Gaging by the sense of touch requires skill without any recourse to magnification. Gaging by sight permits magnification of the error with greater **surety of uniform observation** of the error.

It also makes inspection faster by eliminating the period of doubt while the inspector "feels" the gage as it contacts the work. With a Federal Dial Indicator Gage he **sees** the error clearly and positively. It makes no difference whether the inspector is unskilled or simply tired or whether Bill is inspecting or Massey. A Federal Dial Indicator Gage magnifies the error to where it can be quickly distinguished.

Thousands of designs for faster, more accurate gaging of war material have been made by FEDERAL. Maybe one of them would help you. Why not find out?

FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET PROVIDENCE, R. I.

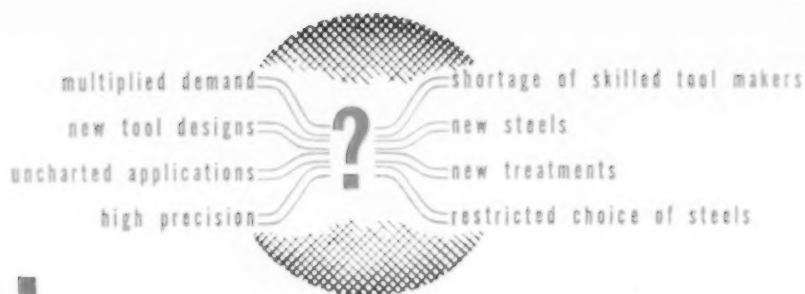


A typical Dial Indicator Snap Gage which shows the exact variation in size. It does not depend upon the uncertain "feel" of the common fixed type of gage.

★ ★ ★ ★ ★ **FEDERAL** ★ ★ ★ ★ ★

P R E C I S I O N M E A S U R I N G I N S T R U M E N T S

Chicago • Cleveland • Detroit • Hartford • Los Angeles • Milwaukee • Montreal • Muncie
New York • Philadelphia • Pittsburgh • Rochester • San Francisco • St. Louis • Toledo • Toronto • Windsor



Aid on wartime tool steel problems

Top speed war production demands TOOLS — *more* tools than dreamed of in peace time — *new kinds* of tools for new war time jobs. The tool industry is tackling this tremendous task short of skilled tool makers and restricted by shortages in their choice of steels.

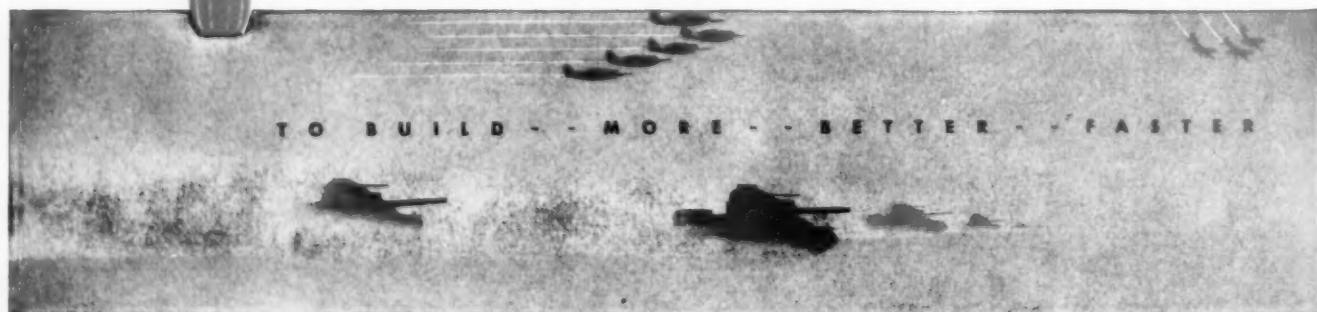
Solutions to these new problems are being worked out every day by the tool industry. Frankly, we don't have all the answers but our contacts with American tool makers determined to win this war puts us in a position to assist you in finding solutions to some of the particular problems that may be facing you.

On your problems of steel selection and treatment of tool steels, we would be very glad to have you get in touch with us. For your convenience, we are listing below the addresses of our district offices.

COPPERWELD STEEL COMPANY • WARREN, OHIO



BUFFALO	1127 Liberty Bank Building	Washington 7283
CHICAGO	122 S. Michigan Avenue	Harrison 1411
CLEVELAND	1158 Union Commerce Building	Cherry 1326
DETROIT	7-251 General Motors Building	Trinity 1-1760
NEW YORK	117 Liberty Street	Cortlandt 7-8314





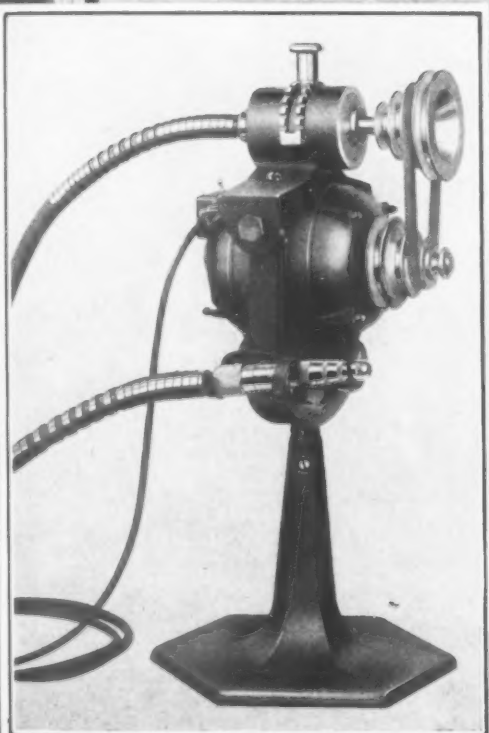
Jarvis

POWER TOOLS

READY FOR ACTION

Jarvis Power Tools as used in the manufacture of engines, propellers, planes, ship and instruments have done their part.

OFFICIAL U. S. NAVY PHOTOGRAPH



THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES



REINFORCEMENTS

Top quality cutting tools are effectively reinforcing the production drive of industry's machine tool divisions.

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - CHICAGO STORE: 570 WEST RANDOLPH ST.



HERE'S WHY *Scrap* IS SO IMPORTANT!

SCRAP iron or steel turnings, clippings, short ends, worn out or broken tools, spoiled work, idle and obsolete machinery, etc., are valuable as raw materials for remelting in the production of new steel.

Through previous refining, ingredients undesirable in steel have been reduced—thus the use of properly prepared scrap speeds the refining process and enables new steels to be produced more rapidly. Recapture of scrap—from your plant—means opportunity to save time and labor—hence more steel.


Certain scrap contains valuable alloying elements such as nickel, molybdenum, tungsten, etc. which can and must be recovered to augment primary supply to meet tremendously increased demand for constructional and high speed alloy steels for more planes, tanks, guns, ships, tools and machinery essential to the war effort.

To be of maximum immediate assistance, scrap should be segregated by composition wherever possible. Turnings, spoiled work etc. should be identified (SAE, AISI, NE etc. grade number) at the machine where they are generated and so handled as to avoid contamination by waste material or scrap of other types and grades.

The metallurgical experience of our staff is available to aid you in technical phases of metal salvage.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK, N. Y.



*"Machines without cutting tools
are no more effective than
guns without ammunition"**

Moved by pride in fine craftsmanship, making use of all the engineering skill that science can command, manufacturers of power driven metal working equipment are supplying industry with an ever widening variety of machines.

But these machines, no matter how powerful, how cunningly designed they may be, are impotent, utterly unable to do their job, until they are equipped with metal cutting tools that actually do the creative work.

The production of these cutting tools has been our specialty for many years: first in a small shop, next in greatly enlarged quarters and now in a modern plant devoted exclusively to the correct design and manufacture of standard, special and Gair-Lock inserted blade cutters—the business ends of machine tools.

THE GAIRING TOOL COMPANY
Detroit, Michigan

GAIRING
FOR A
QUARTER CENTURY
SPECIALISTS
IN FINE
CUTTING TOOLS

* ALFRED HERBERT,
English machine tool build-
writing in *The Engineer* (London)



Gairing
TOOL



THERE'S MORE THAN ONE SHOT IN THE TOOL STEEL MAGAZINE

FOR every machining job, there is a tool steel which will produce optimum results as regards the amount of work done per machine hour and per grind.

Teaming up the right tool steel with the job frequently shows phenomenal improvement. For instance, with a connecting rod broach made of DBL High Speed Steel, a well-known engine builder secured 13,533 pieces for the life of the broach, against a previous

best average of 8000 pieces. The increase is almost 70%. A similar company, using 3/8" twist drills made of DBL, secured an average of 30% more holes per grind than with 18-4-1.

War production calls for the best possible performance from every machine tool, new or old. Let our engineers help you to determine the right tool steels to use on your jobs, for improved results. At the same time, they'll make you familiar with

the best *alternate* steel, for your protection in the event of possible future shortnesses in supply.



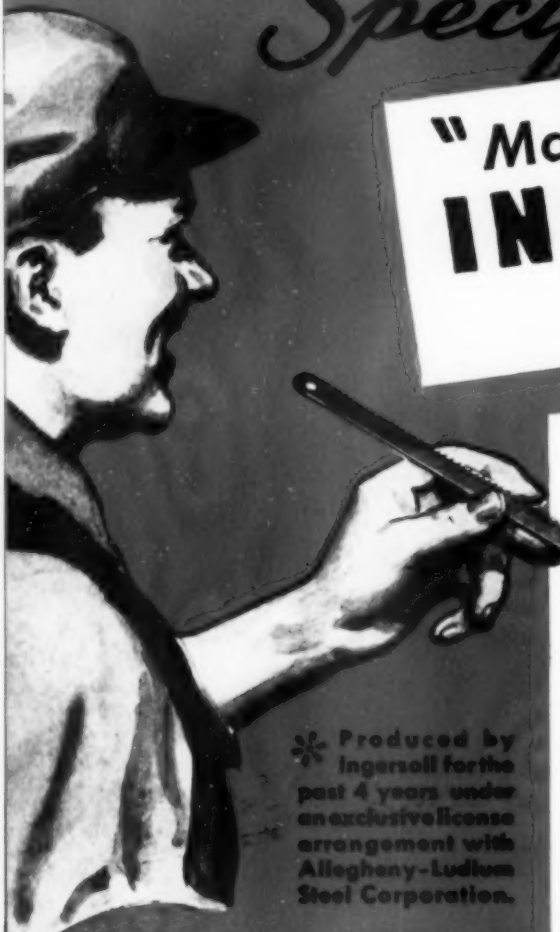
Allegheny Ludlum
STEEL CORPORATION

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

When You Order HACK SAW BLADES

Specify

"Made of
INGERSOLL *D-B-L"
(TUNGSTEN.....5.00—6.00)
MOLYBDENUM...4.00—5.00)



That's the Way You Can
Be Sure of Getting
D-B-L backed by 4 Years'
Manufacturing Experience

Ingersoll D-B-L is the lower cost type of High Speed Steel that has so successfully solved the Hack Saw Blade problem for America's record wartime production.

Four years ago, Ingersoll began to produce D-B-L Steel for Hack Saw Blades. So successful was this product that many Hack Saw Blade users adopted it long before wartime restrictions curtailed the use of vital alloys.

The remarkable performance of Ingersoll D-B-L . . . its relative freedom from decarburization . . . its tough cutting quality and its high impact resistance . . . plus its lower cost, have made it a wartime favorite. Specify *Ingersoll* D-B-L, on its 4-year record of past performance.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION

New Castle, Indiana

Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

**Other Special
INGERSOLL
Sheet Steels
include:**

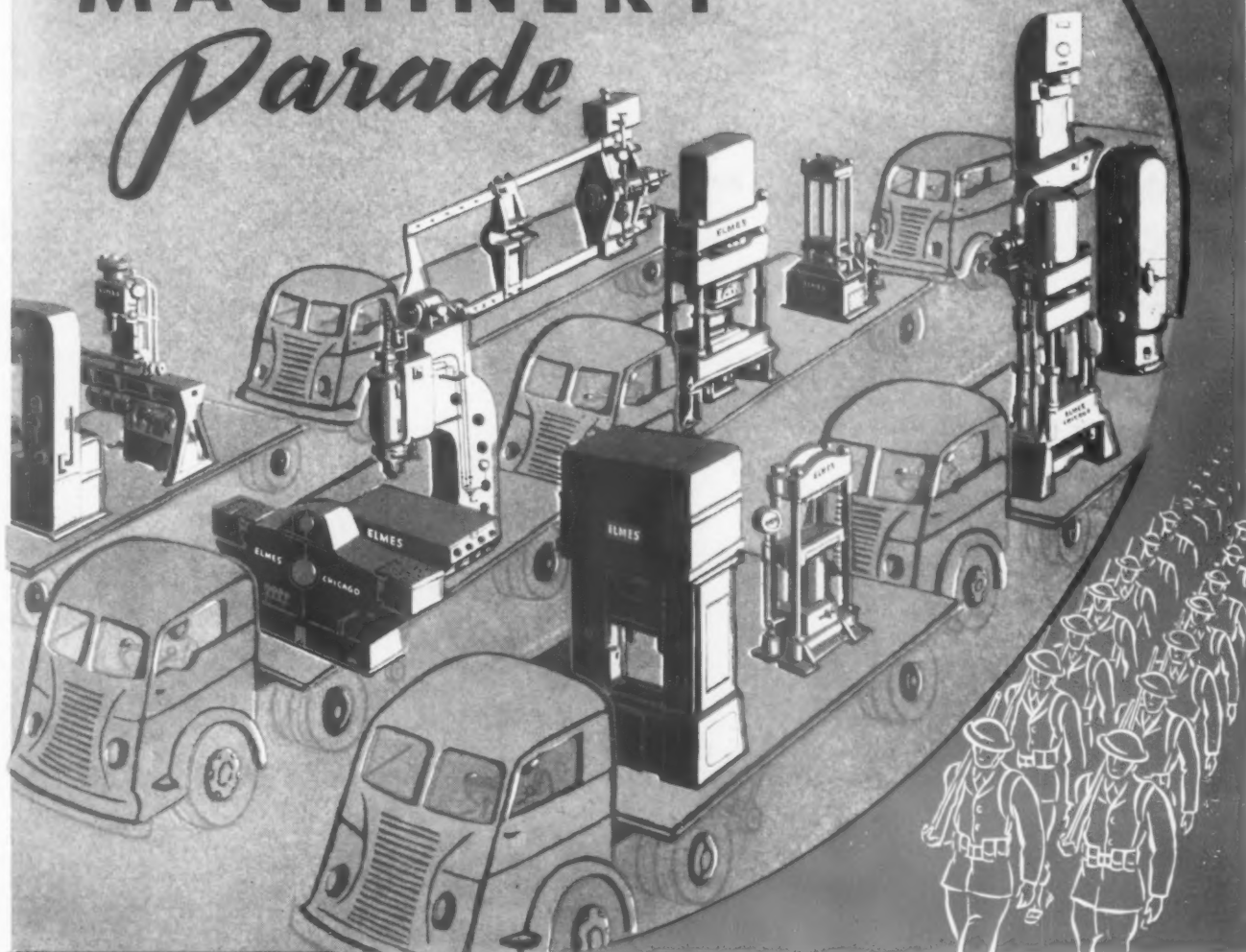
Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad
(Stainless-Clad Steel)

Stainless Steels and Saw
Steels, including "18-4-1"
and Molybdenum and
D-B-L Hack Saw Steels

INGERSOLL STEELS

FOR SPECIAL USES

The HYDRAULIC MACHINERY *Parade*



This "parade" is representative of the broad line of Elmes Hydraulic machinery and equipment. Were it possible to load each typical Elmes-built unit on a truck, and assemble those trucks in a single line, such a parade would be several city blocks long. It would include metal working presses, plastic molding presses, extrusion presses, pumps, accumulators, valves and accessories . . . small units and large—suitable for all types of work—equipment for complete hydraulic installations. Write for a copy of the New Elmes Catalog.

Elmes
SINCE 1851
HAYmarket 0696

CHARLES F. ELMES ENGINEERING WORKS
229 N. Morgan Street • Chicago, Illinois

Also Manufactured in Canada:
WILLIAMS & WILSON, Ltd. Montreal & Toronto—Distributors in Central and Eastern
Canada . . . GORDON RUSSELL, Ltd., Vancouver, Distributors in Western Canada

METAL WORKING PRESSES • PLASTIC MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES



ARMSTRONG

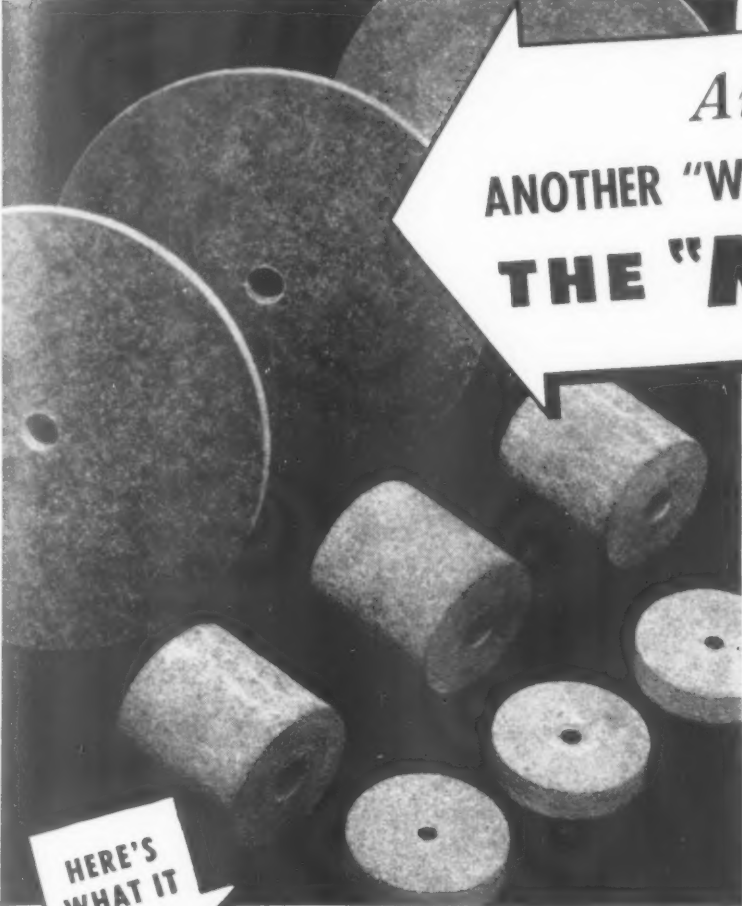


**for high efficiency
in the production of:**

ARMSTRONG TOOL HOLDERS
 ARMSTRONG Turret Lathe and Screw Machine Tools
 ARMSTRONG LATHE DOGS
 ARMSTRONG Drop Forged WRENCHES
 ARMSTRONG Socket Wrenches
 ARMSTRONG "C" CLAMPS
 ARMSTRONG HIGH SPEED STEEL
 ARMSTRONG RATCHET DRILLS
 ARMSTRONG SETTING-UP TOOLS
 ARMSTRONG Machine Shop Specialties
 "ARMSTRONG BROS." PIPE TOOLS

— all vital tools of modern warfare





Announcing ANOTHER "WEAPON FOR PRODUCTION" THE "MX" WHEEL

*Pioneered and offered to industry
exclusively by Carborundum*

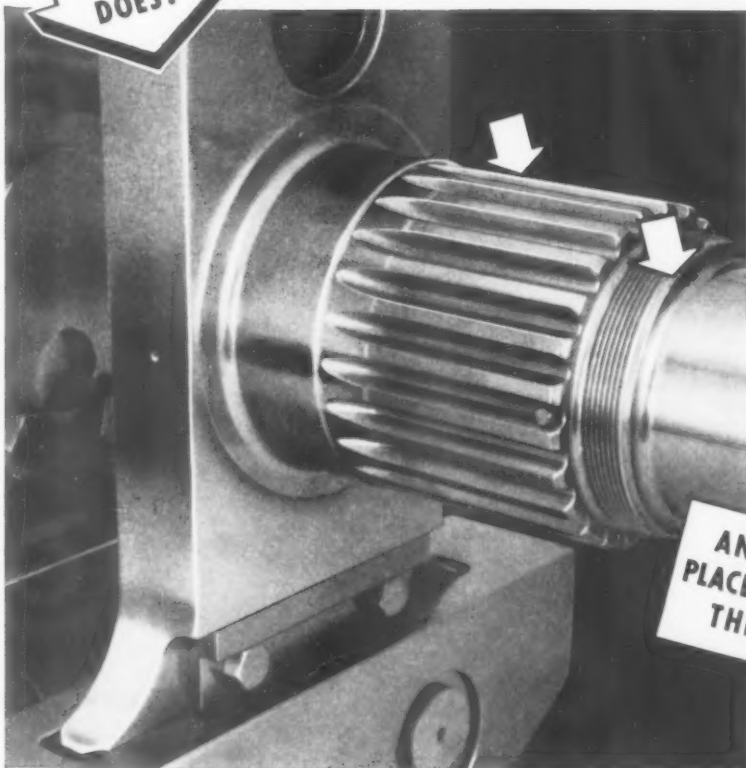
LESS than a year old, the "MX" Wheel is already making a name for itself as a "Weapon for Production." It is a free-cutting wheel capable of light stock removal and high polishing action at the same time. It requires but little pressure. It is used dry, since no coolant is required at the low cutting temperature developed. And its flexibility adapts it particularly for use in finishing and polishing out-of-the-way places on airplane engine parts and similar work.

Some typical applications are indicated by arrows on photos below. They include breaking down burrs or sharp edges on gear teeth, finishing and polishing splines and hard-to-get-at flat surfaces, depressed areas and various types of undercuts.

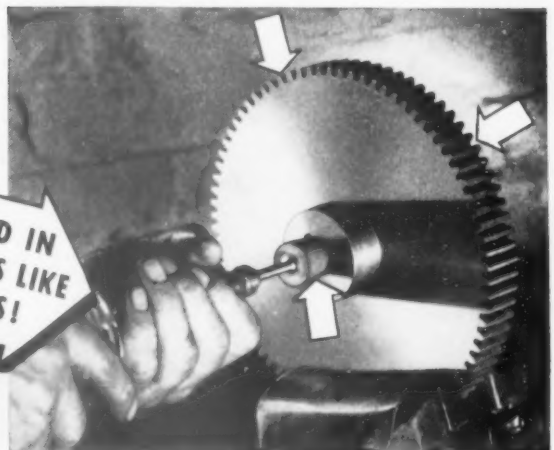
These new wheels are so fabricated as to give variable degrees of resiliency and flexibility, in six grades of hardness. They are made in grits 50, 80, 120, 180 and 320. Diameters range from 1" to 12", and thicknesses from $\frac{1}{16}$ " to 3". More complete information on request.

CARBORUNDUM
ABRASIVE PRODUCTS

HERE'S
WHAT IT
DOES!



AND IN
PLACES LIKE
THIS!



THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.
Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids
(Carborundum and Alomite are registered trade-marks and MX is a trade-mark of, and indicate manufacture by The Carborundum Company)

Operate your drill presses
and radials
to capacity
with Apex Safety Friction
Tapping Chucks

Guaranteed to minimize tool breakage . . . save time and materials . . . and help inexperienced operators produce more, faster.

In every detail, Apex safety friction chucks are *right*. Made of finest material for the job, precision built throughout. Easy to adjust, and once adjusted, maintain proper tension over long periods. End thrust set up by tapping or pressure exerted by the operator does not affect friction setting. Friction disc element can be replaced quickly and at low cost when necessary. Used for tapping thru and

bottom holes, drilling, reaming, stud setting, nut setting, spot facing, counterboring . . . wherever tool is apt to break. Shanks supplied for all requirements. Tap capacities up to 3". Considering today's conditions, reasonably good deliveries are obtainable.

How to save time on orders: Make sure you give type and tool numbers. If non-standard tools are called for, make a drawing or sketch, or give complete specifications. This will insure prompt handling of your order and prevent possible delay for lack of information. Write for complete catalog of Apex Production Tools.



APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of friction chucks, quick change chucks, positive drive chucks, vertical float tapping chucks, semi and full floating tool holders, stud setters, screw drivers, power bits, universal joints, plain and universal joint socket wrenches.

WATCH YOUR

Speed AND Feed!

Tool Conservation Demands that the Rates be Right

When you are using properly designed and sharpened metal cutting tools, no factors of operating efficiency are more important than the selection of correct speeds and feed rates for each milling job.

Since proper selection is dependent on many variables, it is vital that *all* circumstances be considered. Such factors as the sharpness of the cutter, the proportions and depth of the cut to be made, the type and hardness of the work material, and the condition of the machine have their influence on the cutting operation.

Therefore, an intelligent analysis of cutting speeds and feeds on *each set-up* will be of great help in getting the most production and the longest life from your cutting tools.



ILLINOIS TOOL WORKS

**MANUFACTURERS OF METAL CUTTING
TOOLS AND SHAKEPROOF PRODUCTS**

2501 N. Keeler Avenue, Chicago, Illinois

**In Canada: Canada, Illinois Tools, Ltd.
Toronto, Ontario**

ILLINITE

High Speed Production Tools

*Hobs • Broaches • Shaper Cutters • Milling
Cutters • Ground Form Tools • Special Tools*

★ ★ ★

Gear Measuring Machines

Gear Measuring Blocks

Die Filing Machines

Greenlee
G

AUTOMATIC NEWS

PREPARED BY GREENLEE



BROS. & CO., ROCKFORD, ILL.

GREENLEE BROS. & CO. WORKERS SALUTED BY ARMY AND NAVY

Honored With The Army-Navy Production Award

In an impressive ceremony on the company grounds, Greenlee Bros. & Co., Rockford, Illinois, was presented with the prized Army-Navy "E" Production Award, Thursday, September 3.

This proud citation to the Greenlee Organization and its workers is in recognition of outstanding services in the production of machinery and tools vital to the war effort.

The award, consisting of an "E" flag to be flown above the plant and a lapel pin for every Greenlee employee, was presented by Lieut. Colonel Edward H. Bowman, chief of Chicago Procurement District, and Lieut. Commander R. J. Twyman, District Personnel Office, 9th Naval District.



Lieut. Colonel Bowman is shown above presenting the Army-Navy "E" Flag to Mr. George C. Purdy, president of the company. In making the pennant award, Lieut. Col. Bowman declared, "The Army Air Force congratulates the management, and you, the workers, for your excellency in workmanship on the critical machines you are manufacturing. . . ."



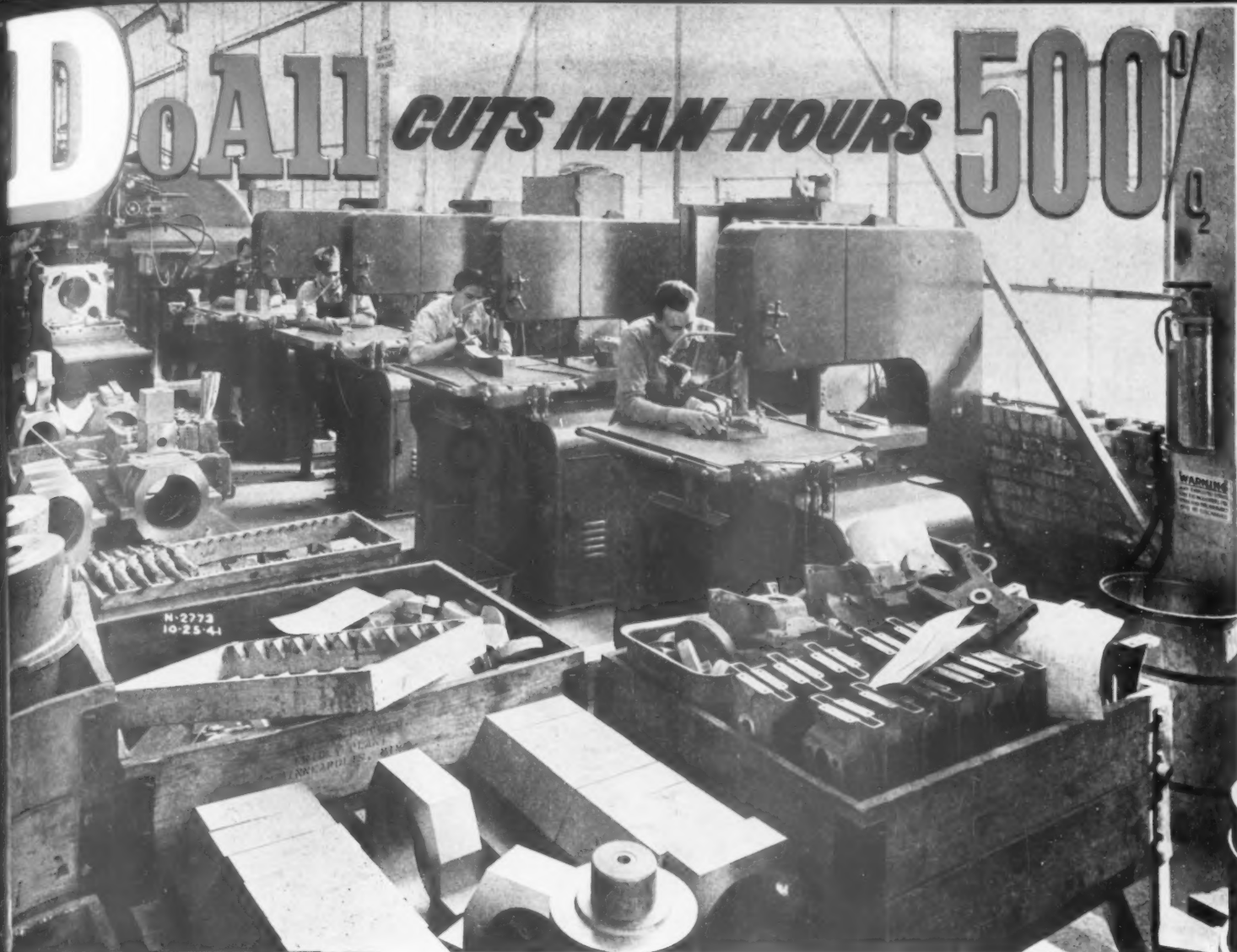
EMPLOYEES GIVEN PINS

All employees of the plant — most of whom work 12 hours or more each day turning out the machine tools needed to produce the weapons of war — received silver pins, symbolic of the Government's appreciation of the fine work they are doing. The photograph at the left shows Lieut. Commander Twyman presenting lapel pins to representatives of the employees. Lieut. Commander Twyman saluted the Greenlee Men and Women for their exceptional performance in turning out Greenlee Automatic Screw Machines, Greenlee Special Transfer Machines for machining airplane engine parts, Greenlee Woodworking Machinery and Greenlee Tools.

MULTIPLE-SPINDLE
DRILLING, BORING
AND TAPPING
MACHINES

Greenlee
BROS. & CO. G
ROCKFORD ILLINOIS U.S.A.

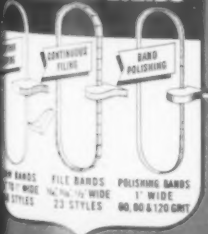
AUTOMATIC SCREW
MACHINES
AIRCRAFT PRODUCTION
MACHINERY



The first DoAll, drive shafts for wob-
bumps are filed in 30 min. each.
Only they required 3 hours of hand
work. The other DoAlls are sawing out
ways, filing key ways for gun mounts
machining 6" thick die blocks. Bins
filled with DoAll production jobs.



**THE DOALL™ USES
3 KINDS OF BANDS**



● Don't worry about your shape cutting jobs. The DoAll gives you a precision finish on $\frac{1}{2}$ " thick armor plate as shown at the left—metal blocks a foot thick—tubing or flats or sheet metal—special replacement parts for machines or equipment. DoAll performance will amaze you because (a) the speed with which cutting is done saves valuable man hours, machine time and power, (b) no further machining is required.

The DoAll is a MUST in every tool and die room, also a regular First Aider on production lines — easily moved to any part of a plant to relieve \$5,000 to \$40,000 machine tools of overload work.

ASK FOR DEMONSTRATION IN YOUR OWN PLANT

Free Book—"DoAll on Production"—a pictorial story of DoAll at work in many plants. Send for copy.

CONTINENTAL MACHINES, INC.

1304 S. Washington Ave., Minneapolis, Minn.

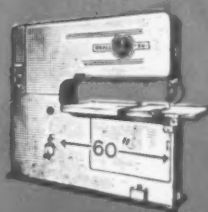
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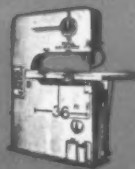
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UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



HIGH CYCLE

HOW HARD-FACING

saves Time, Power, and Materials

What Hard-Facing Is

Hard-facing is the process of welding on to wearing parts a coating, edge, or point of a hard metal—usually a special alloy possessing exceptional wear resistance. By this method, it is possible to protect metal surfaces that normally wear away rapidly in service. This process can be applied with equal advantage to new parts before they are used, or to worn parts.

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Hard-facing gives considerably longer life to wearing parts of many different kinds. Depending on the hard-facing rod used and the service to which the part is subjected, a hard-faced part will last from two to twenty-five times longer than a steel part that has not been protected by this method. Most parts can be hard-faced again and again.

Less Shutdown Time

As a result of the increased life of hard-faced parts, fewer shut-downs for replacements are necessary. This avoids lost time for both labor and equipment. In addition, problems of obtaining replacement parts are often completely eliminated.

Less Steel Waste

Many parts that would otherwise have to be sent to the scrap pile can be salvaged by hard-

facing and quickly put back into service at a cost considerably less than that of replacement with new stock. And since such salvaged parts usually can be hard-faced repeatedly, it is possible to reduce the stock of reserve parts.

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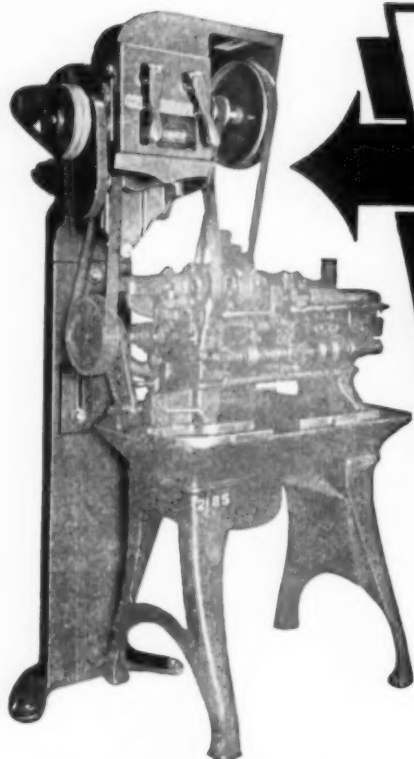
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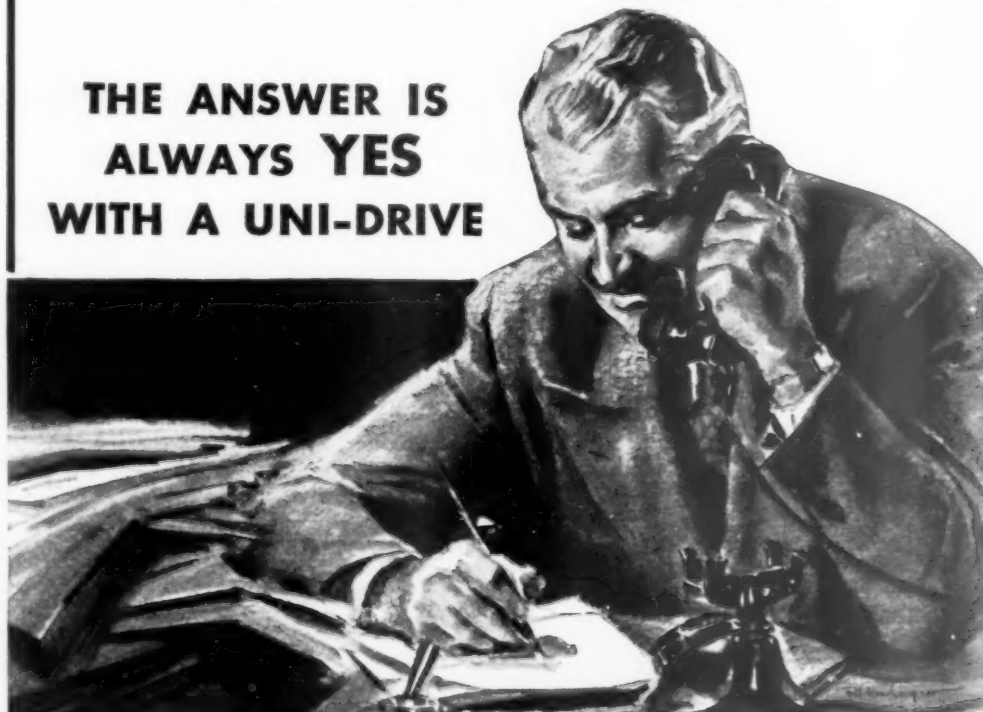
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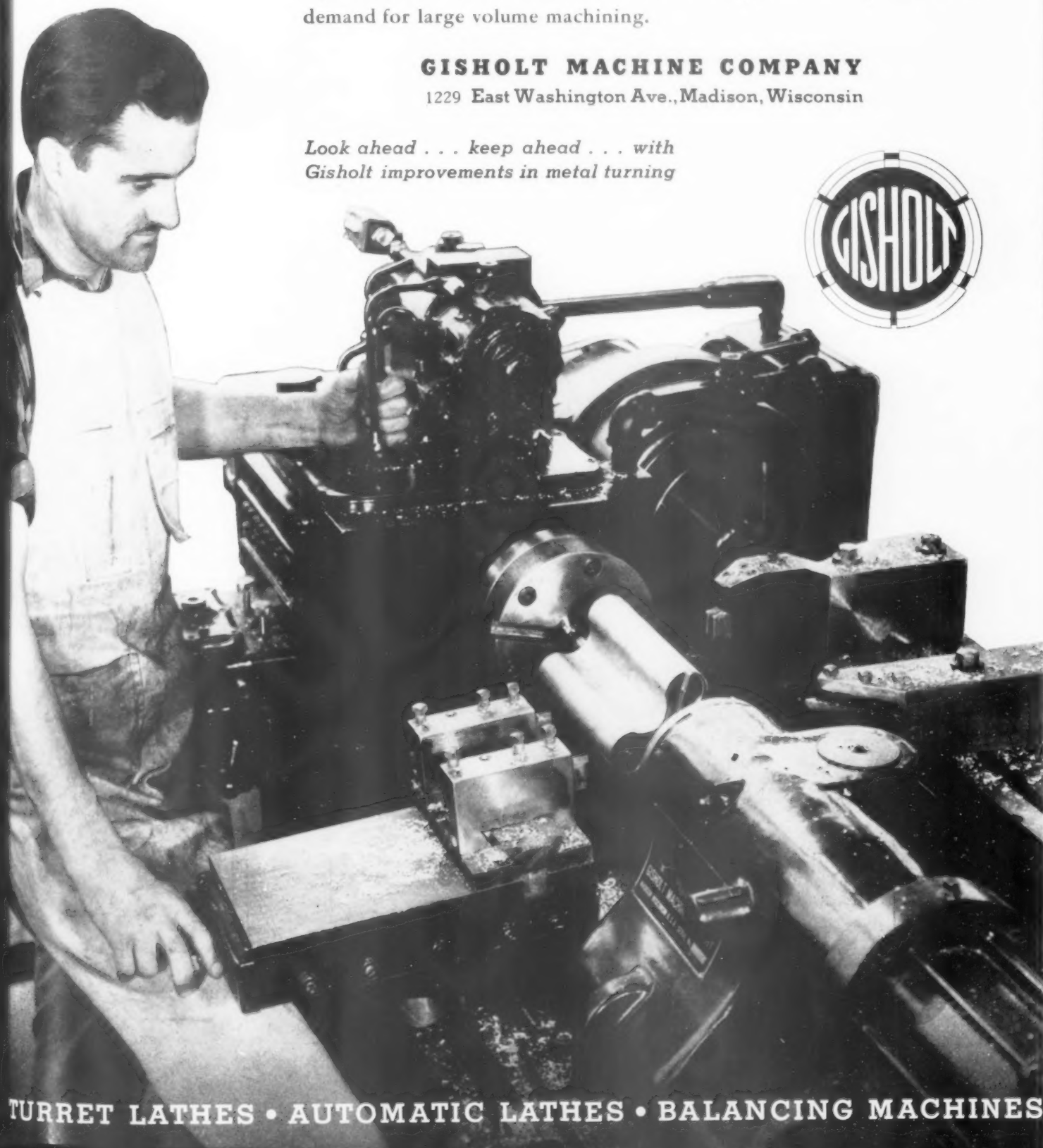
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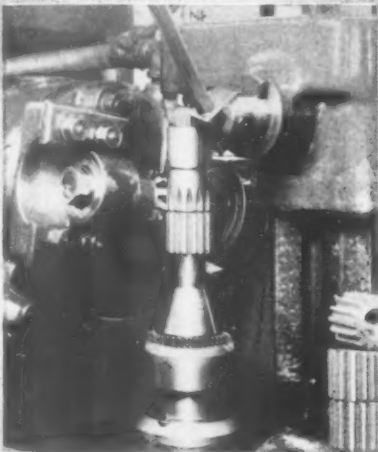
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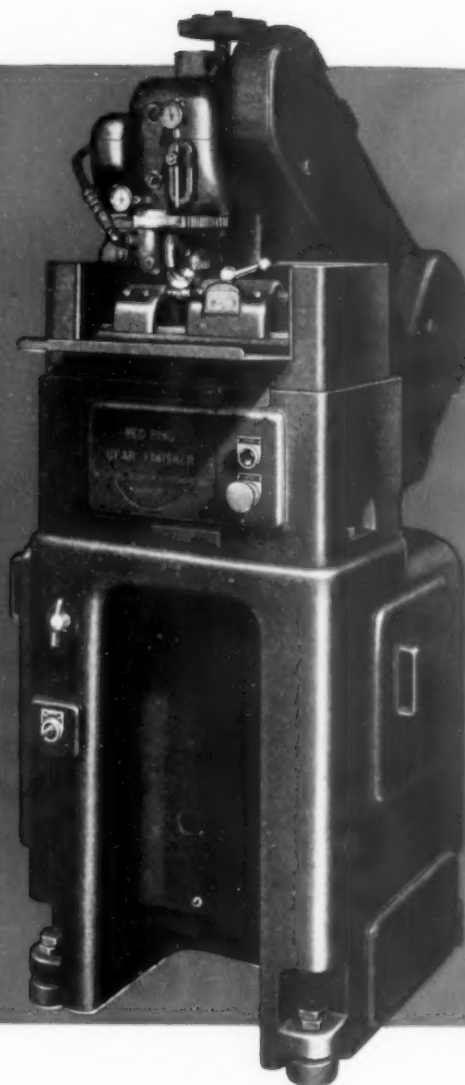
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will increase production by eliminating operator movements, reducing operator fatigue, increasing tool life, reducing rejects, etc. Records of increased production range from 50 to 1500 per cent. Write for latest catalog number, TE11.

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SENACON Air Motor operating special collet holding fixture on drill press. Air Motor automatically synchronized with drill press movement via drag link connection to quill.

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Hannifin hydraulic presses are built in a wide range of standard types, capacities 5 tons to 200 tons, for straightening, forming, assembly, and similar operations. Standard designs can be readily modified to provide the table construction, gap, reach and ram stroke you need. Write for descriptive bulletins, or consult Hannifin engineers for specific recommendations.

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H A N N I F I N
Hydraulic **PRESSES**

THE TOOL ENGINEER

T.M. Reg. U.S. Pat. Office

NOVEMBER, 1942

Volume XI, Number 11

ADVERTISING AND TAXES

BECAUSE ADVERTISING PAYS the way on this magazine, it is fitting to affirm the Treasury Department's realistic views on the value of advertising today. Discouraging of advertising by refusal to allow deduction of its cost on tax returns would limit the amount of material on better and more efficient production methods which would be furnished mass production engineers.

To discourage advertising would also have an evil long run effect. The industry which furnishes tools for production has increased its overhead tremendously. It must sell its expanded facilities today for use after the war.

Elsewhere on this page, we have counseled against saving for peace that which can be used in war. But, tax dollars gained from money spent on advertising will not serve today as well as technical advancement. Advertising, as well as editorial material, is disseminating information which improves mass production techniques. It lowers the day to day cost of war and shortens its duration.

SHOULD WE SCRAP MACHINERY?

DONALD NELSON has stated that we must not store machinery and equipment against the end of the war. It must all be made available so that we may win the war. Of four alternatives, we may, put machinery to work as it is; modify it considerably and use it for a new job; use it as a source of spare parts; or finally, scrap it.

The first three possibilities clearly outline the Tool Engineer's duty. So far, Tool Engineers have refused to recognize almost any combination of frames, spindles and gear trains as obsolete. They have pulled stone planers from marble quarries and cut metal with them. They have resurrected Civil War equipment and made it produce anti-blitz weapons. They have replaced hand feeds with hydraulic controls.

Tool Engineers have now been called upon to save from the scrap pile millions of dollars worth of idle equipment now being held for peace. It may be argued that this equipment belongs there if no other use can be found for it, in the victory program, that must precede peace-time considerations. Such machinery would be of small use in a warehouse that had been bombed. It would be of little use after a war prolonged to a point that our economy had suffered an almost incurable set-back. It would be of no use after

a war we had lost to nations that would dominate us.

We know there is use for it now.

Industrial Conversion Chief, Lessing Rosenwald, has announced, "If a machine hasn't been used for the last three months and no one can prove it can be used in the next three, find a use for it or scrap it."

Washington has issued definite orders. The job of carrying them out will be up to America's Tool Engineers who are fighting to win the battle of production now.

MUST SMALL PLANTS QUIT?

CLOSE TO THE PROBLEM of what to do with idle machinery is that of idle plants and idle talent. If nothing is done with small business, it must in the interests of victory disband for the duration, possibly with little hope for future reorganization.

A solution to the problem has been found by a group of plants who formed the New England Small Arms Corporation.

We have complimented the altruism of highly competitive companies who have buried their sales hatchets to merge ideas and talents toward winning the war. We must compliment with equal fervor this group which was completely non-competitive, had nothing in common except to individually go out of business or to combine brains and facilities to serve in the war effort. Representatives of the various plants sat around a table, and according to their abilities and experience distributed between themselves the component jobs necessary to building and assembling the famous Browning automatic rifle.

This plan can be worked out in communities all over America. However, small businesses must not expect the government to do it for them. It is not a job for which our government has experience, nor for the kind of government we are fighting to preserve. It is a job for engineers with initiative, for people who vote and pay taxes.

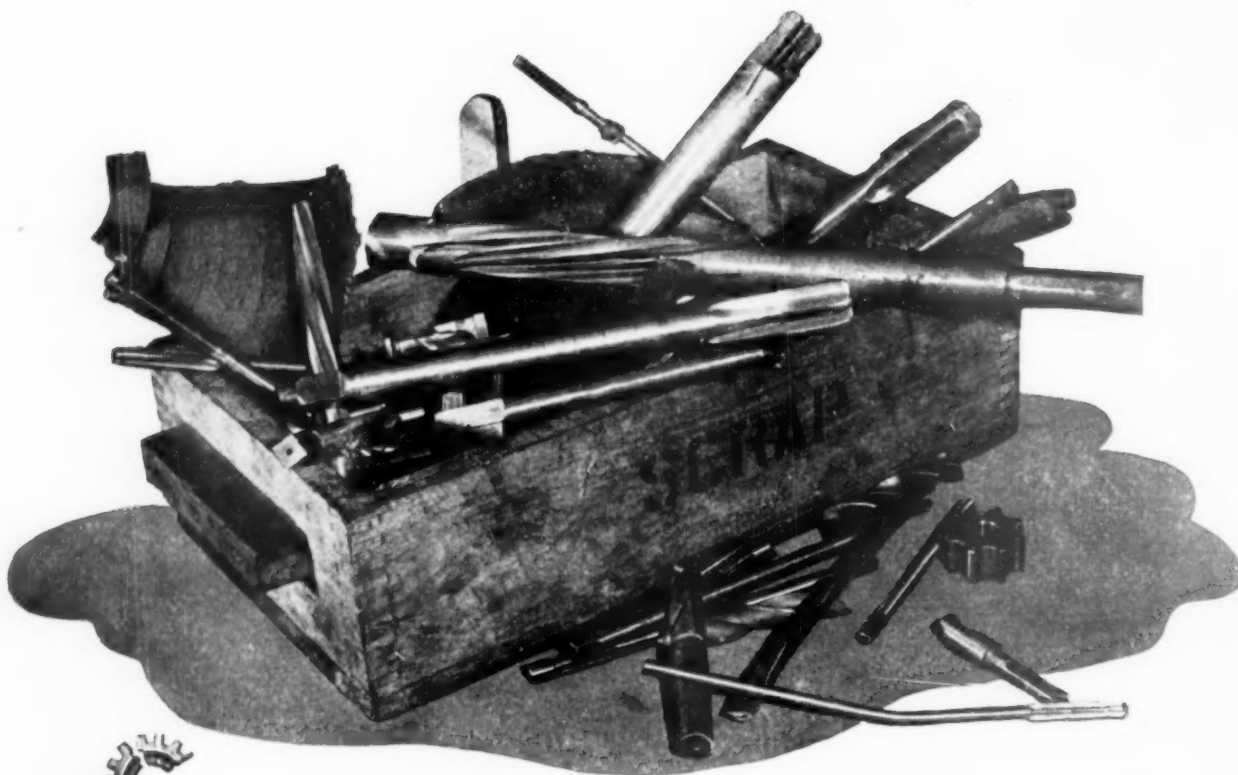
Our capitalist economy has stimulated engineers to develop initiative. Their exercise of this right to initiative is in itself one way to help preserve it even in peace-time. Today, though, it has more vital meaning. It can contribute to winning the war and it can save many a small business from going under.

More of the story on how this was done, and what sort of Tool Engineering was required, is told in this issue.

ROY T. BRAMSON, Editor and Publisher JEROME S. WILFORD, Managing Editor ANDREW E. RYLANDER, Technical Editor
WALLACE A. SCOTTEN, RALPH E. DAVIS, ALBERT C. COCHRANE, Associate Editors

NOVEMBER, 1942

63



SCRAP SALVAGE

is a **LAW** at GREENFIELD . . .



SO ACUTE is America's metal shortage — particularly of high speed tool steel — that today the importance of scrap cannot be overemphasized.



Industry has a responsibility it cannot evade, not only to *reduce* scrap-making in plants, but to *salvage* it to the last ounce. Even the tungsten from filings and sludge must be recovered and turned back into productive channels.



The GREENFIELD TAP AND DIE CORPORATION has assured our Government that a rigid plan of salvaging is now in force in every department of its plants.



What "Greenfield" is doing, must be done by every factory and shop throughout the country. Failure to carry out a scrupulous system of salvaging can almost be viewed as actual sabotage!



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O.W.I. Photo by Palmer

A highly practical application for boring and contour facing in one set-up. Note the tool post turret and the "floating" boring bar, presumably piloted in the lathe spindle. The whole implies precision and production with simple tools.

BORING, AND BORING TOOLS

A. E. RYLANDER
INDUSTRIAL ENGINEER

ONE might infer, from the broad literature already existent on the subject, that boring is a closed book—with standardized, commercial tools covering the entire range of boring operations.

However, we are far from the ultimate, and recent developments—as the introduction of hydraulic boring units—have necessitated various refinements and modifications in tool and fixture design.

Then, too, modern war production has created new

and complex problems, not only in boring and kindred operations, but in all phases of tooling for mass production. The solutions of these problems, in turn, have effected improvements which, if not radical departures from conventional practice, at least defy immediate standardization.

Various of these innovations, as well as conventional designs, will be discussed in this writing—with, however, the reservation that many of the "special" tools evolved at this time will be standards of the future.

THE FOLLOWING SIX PAGES ON BORING AND BORING TOOLS SHOULD INTEREST EVERY MASS WAR PRODUCTION ENGINEER. THIS IS THE FIRST OF A METAL CUTTING SERIES BY MR. RYLANDER.

Here are 14 new boring tools, war-plant tested. They work!

BEFORE entering into discussion of design and practice, the writer would suggest that he claims no particular originality in treatment of subject. Nor does he claim any credit other than for contributory development as specific problems have necessitated equally specific solutions. And, while some of the ideas presented may be novel (to some readers), the most are essentially improvements on existing designs in more or less common use.

They have been "redesigned", so to say, to meet unusual conditions; as such, they imply evolution rather than invention *per se*. Novelty, such as there may be, lies in their practical application to modern machine tools and the problems brought on by scarcity of metals on the one hand and the introduction of new and largely untried materials on the other. In bridging those extremes, they have proven their worth, and various of the ideas shown

may well be incorporated in modern design.

Referring, now, to Figure 1, we have a boring operation (rough and finish) in combination with a counterbore and a chamfer. There is also a facing operation, which may or may not be done at the same setting, depending on the power of the driving unit; at any rate, a facing cutter is suggested in the illustration although it is not detailed because it would entail too much confusion of lines.

By precedent, and according to more or less common practice, the chamfer—counterbore calls for a formed tool, as shown. But such tools are expensive and may easily be ruined should a corner chip off, as often happens when a single bit or diametrically opposed tools are used for interrupted cuts.

Of course one could use a formed, multi-tooth cutter, with teeth unevenly spaced, and many favor such tools. However, they're expensive too, with deliveries likely as not in the remote offing. A better way, since it is inexpensive and equally efficacious, is to incorporate two single bit tools, one for the counterbore, the other (set at the required angle) for the chamfer. See Figure 2.

In the event of breakage, one merely replaces simple tools, either of which may be adjusted independent of the other. As for the boring, it is advisable (for the type of bar shown) to provide for interchangeable roughing and finishing tools.

It may be well to suggest, here, that while several of the illustrations center around the same job, succeeding designs deviate variously from their predecessors. This is not inconsistency, rather, the pictures are purposely drawn with a view toward showing the greatest possible number of ideas with the fewest possible cuts. For instance, Figure 1 shows a plain boring bit, with a single, formed tool for the chamfer-counterbore, while Figure 2 shows the two single tools along with an interchangeable boring bit holder for the rough and finish cuts. This tool may well be described in detail.

Note that the bit is contained in a round holder having a slip fit in a bored hole. This has various advantages over the square or rectangular holder commonly used. For instance, it is easier to drill and ream a round hole than to broach a square one, and easier to grind the holder round, slip fit than rectangular. So, we save on tool costs.

The holder butts against a stop which also serves as a gage block; *i. e.*, it establishes the diameters of the successive cuts, the while a milled slot and tongue holds the tool at the

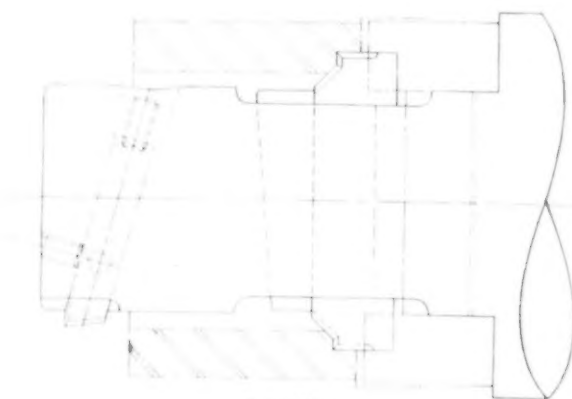


FIGURE 1.

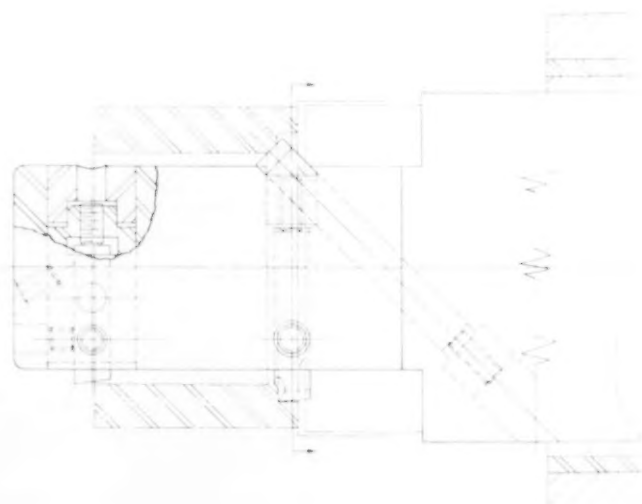
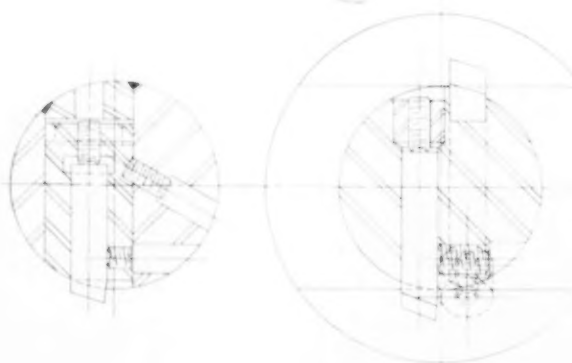


FIGURE 2.

proper cutting angle. This stop is pressed and welded into the hole, and is tapped for an adjusting screw. In practise, the tool bits are bench set and adjusted to the proper cutting size from the ground heel of the holder. Once inserted in the bar, it may be further adjusted to the cut by means of the adjusting screw at the heel of the tool.

Note, now, that tool bit is clamped solidly in the holder, yet may be loosened for adjustment through the clearance holes in the bar. Note, also, the angular clamping of the holder, so designed for the purpose of forcing the holder hard against the gage block. This prevents any forward creep of the tool, screws at right angles having a tendency to "walk" in the line of least resistance. Now, one more note with regard to this holder: — once the bit has been properly set for the cut (as by a trial cut), mark the exact gaging on the holder. Then, replacement tools may be accurately set to the dimensions established.

Points of Design

Figures 1 and 2 contain a few points of design other than those so far discussed. Note the comparative methods for endwise adjustment of the boring bit, as in Figure 1, and of the chamfer and counterbore tools in Figure 2.

The first is adjusted by means of a screw of about the same size as the diagonals of the bit — e. g., a $\frac{5}{8}$ -inch bit would call for a $\frac{7}{8}$ -inch screw. Rather large, eh? Preferably counter-bore a $\frac{7}{8}$ -inch hole before broaching (an excellent guide for the broach), then, weld in a plug which may be tapped for a smaller screw, say a national fine.

And now an explanation of the method used for clamping the formed cutter, Figure 1. As noted, it is positioned diametrically by means of milled and ground flats, and clamped with a wedge. This is along conventional lines, although the wedge is at the front so as to be clear of a facing cutter, assuming that one is used. The use of a facer, in turn, would imply a somewhat larger diameter for the boring bar, so that the cutter can recede into the bushing without interference. That means that if the facing cutter is $5\frac{3}{4}$ -inch diameter the bushing diameter would be 6 inches in round figures, to clear.



FIGURE 3-A.

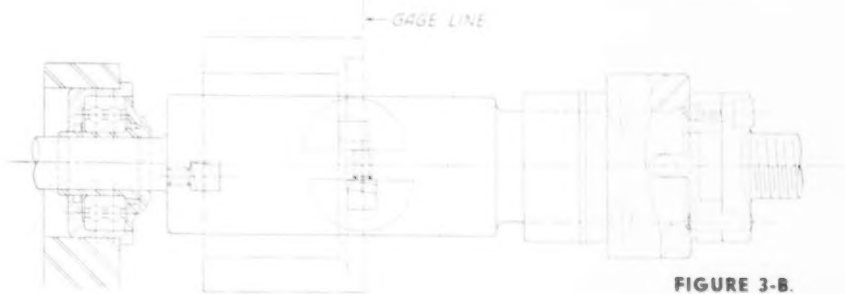


FIGURE 3-B.

With that explanation, it will be seen, from the following, that the composite bar design of Figures 1 and 2 is a sort of "horrible example" and not to be generally recommended. However, the tool holders and adjustments shown are pat and applicable, may well be emulated.

While the specific job determines design and application, it can be generally accepted that several comparatively simple boring bars, with simple tools, may be preferable to one compound bar in which the various cutters must be gaged and correlated.

For one thing, error is localized and easily compensated for, and for another, the total cost of several plain bars will likely as not compare favorably with that of a single compound. While it may be contended that one gets faster production with one bar, entailing but one pass, this result does not always follow in practise. A roughing and finishing cut is usually required anyway. No, it's design, and careful consideration of operation sequences, that determines the productive efficiency of a tool.

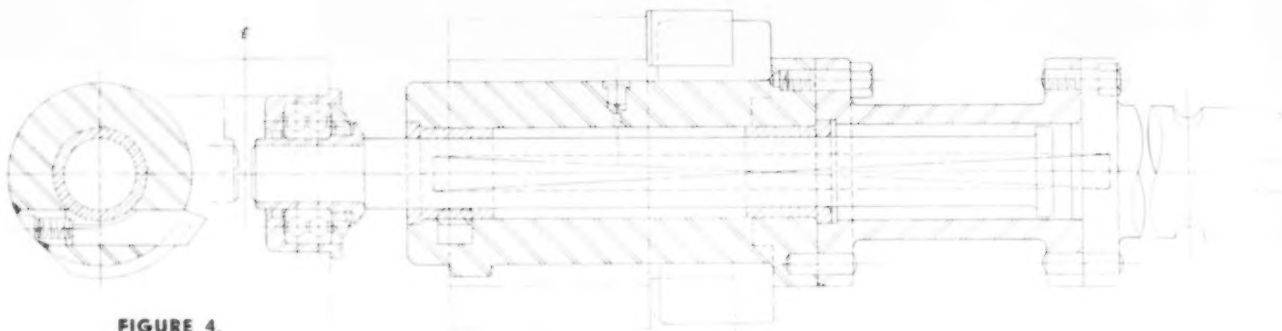
A compound tool may require so much attention and adjustment, due to uneven cutting wear, that its theoretical values are entirely cancelled out. But, in the simpler tool, a dull or damaged cutter can be replaced while another is working. And where two passes are required, modern, quick change chucks enable an operator to change bars as quickly as he would slip out a roughing cutter and insert the finisher.

Such a set-up appears in Figure 3.

the chucks shown being obtainable from several makers. Note, however, that alternate adaptations are shown, differentiated as A and B. The first is a standard chuck with taper shank, the second is also a standard chuck but altered for adaption to a threaded, adjustable shank. It could be made integral, as in A, but was so designed for a reason. Should the shank twist off, one merely replaces the shank, not the whole tool, a provision that may be considered for taper shank holders as well. Tangs have a habit of twisting off, too. Outside of this explanation, the adaptation is so obvious that no further description is necessary.

However, a note of caution is in order. The commercial, quick-change chuck is not practical for close limits in boring, unless modified. There is too much play between the chuck and collets, due to clearance necessary for quick removal and insertion. There is also too much angular play between the driving balls and the locking grooves, which imparts shock on engagement with the cut, and there is also considerable end play, tending toward chatter. This looseness can be disregarded in ordinary drilling and reaming operations, but it just won't do for precision boring. Hence, the following provisions are in order:

(1) If more than one chuck is to be used (as for multiple or opposed boring) lap all chucks out to the same size. This will probably result in the holes being several thousandths oversize, so, (2) grind collets — or bars, as the case may be — to an easy but close slip fit. Be sure to drill breather



holes. Also, (3) provide a driver in addition to the conventional ball drive, preferably using a pin drive, as shown in B. The pin makes its own lead-on. Finally, (4) make the distance from heel of bar (or collet) to the retaining groove a trifle long, so that the ball will tend to butt the heel solidly against the bottom of the chuck. That done, one can count on an adequately rigid grip.

Where various cuts — as depth of bore, facing, chamfering and counter-boring — must be correlated, one lays out the tools so that one stop serves for all. One tool, usually the boring, need not be closely adjusted endwise, but the balance should have some provision for adjustment. However, the use of an adjustable shank (as in B) cancels out one adjustment, which means that one can usually set a facing cutter solidly on the bar.

A typical layout is shown in Figure 3, and may be used as a guide for design. Note, however, the manner of guiding these bars; they are piloted on the ends, on reduced diameters, instead

of on the major diameter as in Figures 1 and 2.

This method has decided advantages that may well be elaborated on. We'll go into that below, first, however, directing the reader's attention to a slight "inconsistency" in the above layout. Note that, in A, the bar is piloted in a conventional, plain bushing, while in B it is piloted in a rotary, ball bearing bushing. Put these alternatives in your book for future reference.

Pilot Diameters

With regard to pilot diameters, remember that we are dealing with surface speeds, a factor often disregarded in design with the result that bars sometimes "freeze" in the bushings after they've run a while, due to heating.

Obviously, the very nominal "slip fit" commonly designated, and adequate for small diameters, is altogether insufficient for a large bar. The running fit allowance must be proportionate to diameter, with further

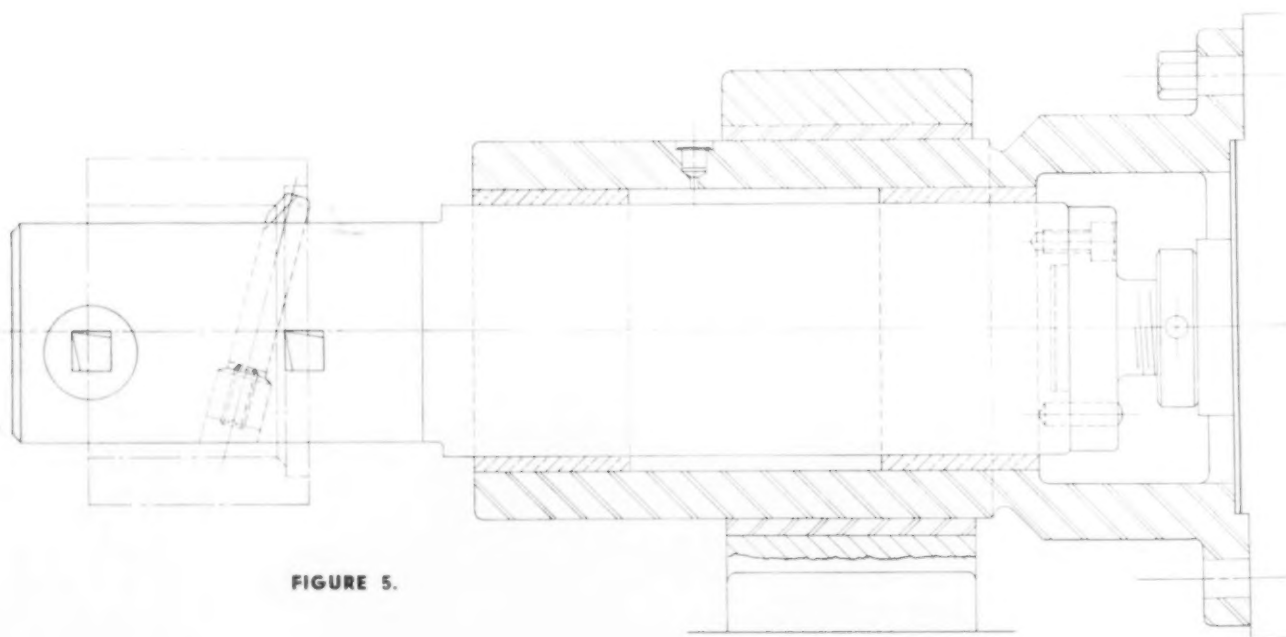
consideration for the speed at which the tool must operate.

For example, it is apparent that a 2-inch bar, running 100 RPM, will have a surface speed of 300 inches (using round figures) or roughly 25 feet per minute. But, a 6-inch bar, at the same speed, will run 1800 inches or 150 feet — six times as fast. Obviously, then, the smaller bar can not only be run faster with less heating in the bushing, but can be fabricated from considerably smaller diameter stock. So, among other advantages, we save in material and labor costs.

Piloted bars (as described above) may be objected to on the ground that ends may butt when boring closely opposed holes. They will — if the designer doesn't know his stuff or lacks the patience to work a problem out to a conclusion.

In this connection, interference can be eliminated by any of several methods, as:

(1) One bar preceding its opposite in the cut and "kicking" back just before they meet — that is, the lead-



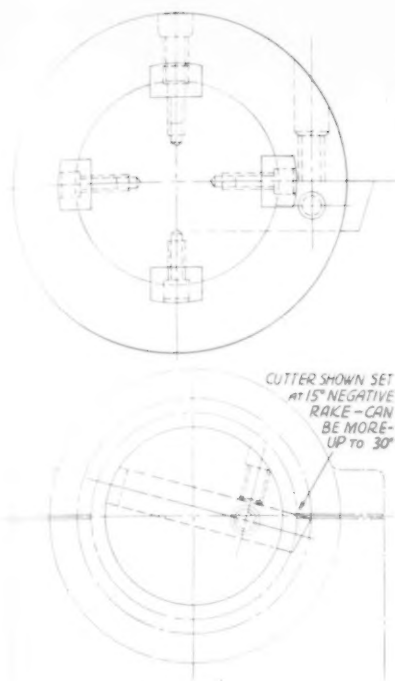


FIGURE 7.

ing bar will complete its cut while the other is still cutting, then withdraw. This is common practise in opposed drilling machines, by the way.

Or, (2), the bars may telescope, one inside the other, although such design implies considerable complication.

Preferably, (3) the pilots should recede into the bars, as in Figure 4. When rotary bushings are used, this entails sliding motion only, with resultant long wear. It also implies an accuracy not usually attained with plain bushings, all other things being equal.

For example, with piloted bars (as shown) accuracy is enhanced the farther one gets into the cut — quite the reverse of guiding on the major diameter, when accuracy decreases as the tool moves out from the bushing. Everything considered, then, bars so piloted embrace not only good principles of design but imply a wide range of application.

For purpose of comparison, the bar shown in Figure 5 is predicated on the same tool set-up as in the previous illustrations. Here we have a compromise between the piloted bar and the one guided on its major diameter. The bar rotates in a sliding bushing head which, in turn, does not rotate, rather, is attached to the faceplate of the motive unit (as a hydraulic boring head) and merely slides in the large bushing.

Naturally, this construction per-

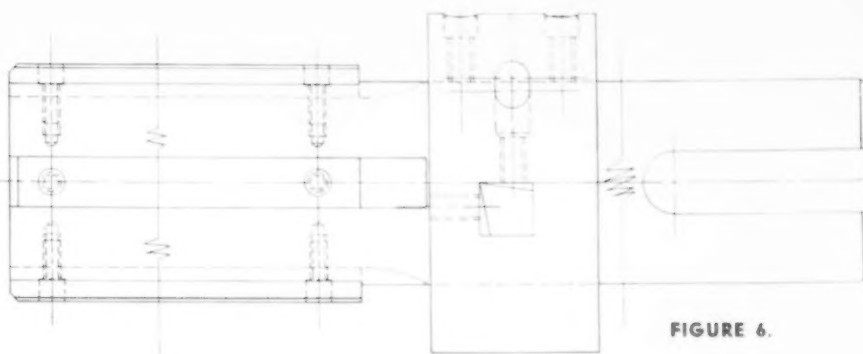


FIGURE 6.

mits considerably higher surface speeds and closer tolerance than would be practical in the design shown in Figures 1 and 2. It even has advantages over Figure 3, in that the accuracy remains constant although the cut, with a yet added advantage that the bar can be receded entirely clear of the major guide bushing.

However, there are disadvantages, too. The design implies compounding — *i. e.*, all tools must be contained in the one bar. This naturally, entails provision for interchanging roughing and finishing tools as well as for the closer end adjustment required for

compound tools.

Another disadvantage is cost (considerably higher than for the large bar in Fig. 1), while accuracy, as compared to Figure 3, is not sufficiently enhanced to warrant the extra outlay. Still, it's a good idea for your book.

One factor, however, has been omitted in the foregoing discussion, and as it has considerable bearing on close tolerance it may be well to mention it. Hydraulic boring units have a tendency to expand as the oil heats, which means that the distance from the base to the center of the spindle may in-

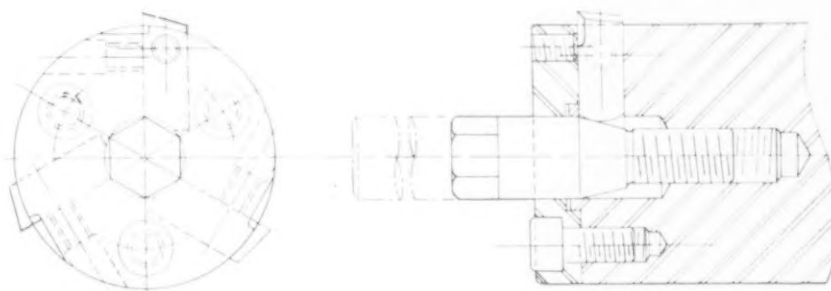


FIGURE 8.

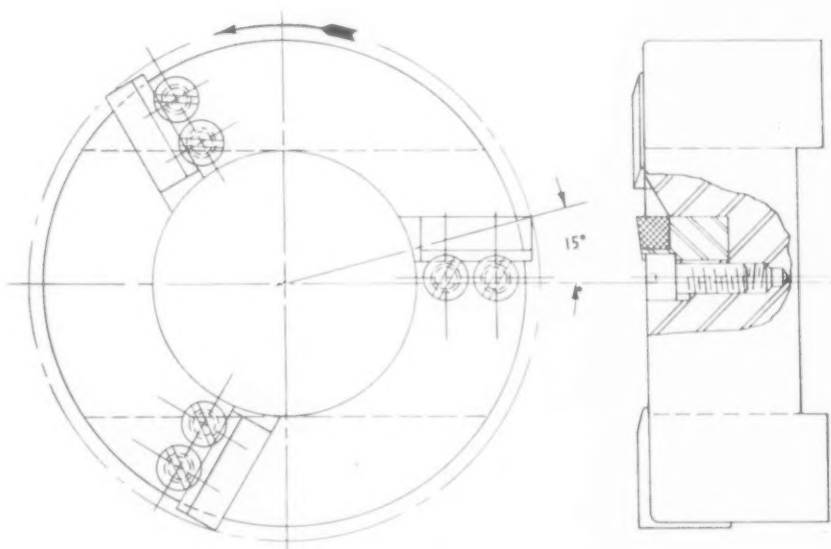


FIGURE 9.

ONE OBJECT of modern tool design is the conservation of critical materials, as alloy and high speed steels. It does not imply the total elimination of these metals, but the use of mild steel and other substitutes where these can be successfully employed without sacrifice of quality or productivity.

In cutting, it implies consideration of the more readily obtainable carbides and related alloys, with holders designed to give maximum support to these otherwise fragile but fast cutting tools. It further implies a minimum of wastage.

For example, a boring bar $3\frac{7}{8}$ -inch diameter, turned from 4-inch stock, will serve as well as if finished to 4-inch diameter from larger stock. (Hold diameters down, and dimension with discretion). These things, and various others, are taken into consideration in the tools described.

crease as much as .005 in a day's run. That would be enough to cause cramping on closely confined bars, and may even cause misalignment of bores. This "creeping" error, pointed out by the chief engineer of a maker of hydraulic units, largely confirms the writer's bias in favor of piloted bars.

Among other advantages, they have the happy faculty of being self com-

pensating, entirely aside from the flexible coupling which makers of hydraulic units recommend to offset the variations caused by heat. There are, of course, other ways to compensate for this error, notably fixtures that rise and fall with the boring heads. Such applications, however, would depend on the job to be bored.

In Figure 6, we have a "kink" de-

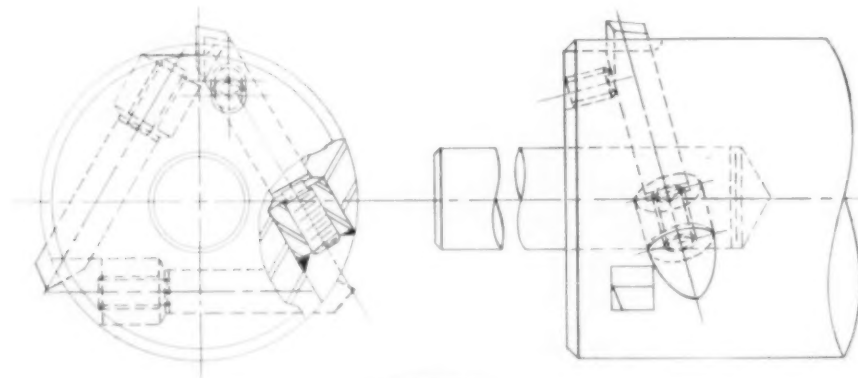


FIGURE 10.

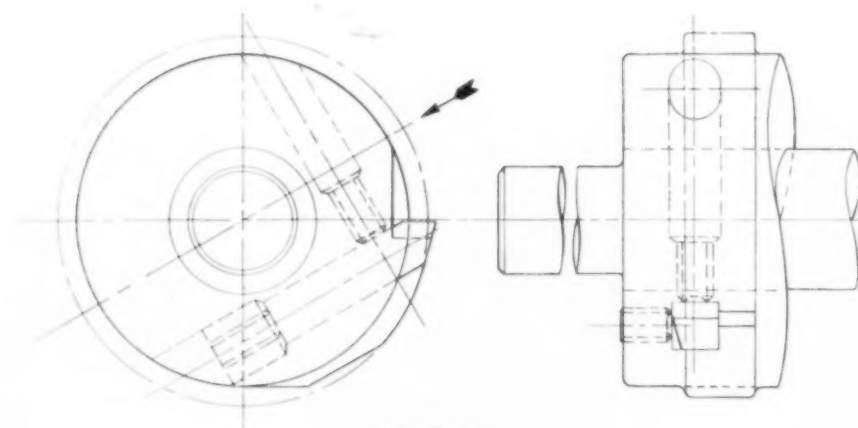


FIGURE 11.

signed to cut costs. Instead of the conventional hardened and ground bar, we use wear strips of pack hardened and ground mild steel, or of bronze, as Ampco hard. These strips will last indefinitely, since they can be shimmed up and reground when worn. The bar may be left soft, all other factors permitting, or may be locally hardened at points of cutter insertion.

One disadvantage of this design is that chips may load up ahead of the strips, although this causes very little trouble in actual use. The sharp edges of the strips act as wipers. As an alternative, the wear strips may be incorporated in a soft bushing, when chips are localized and easily washed out. Either way, the bars run cool as compared to those closely bushed. Another idea for your book, in case you haven't seen it before.

Interrupted Cuts

At the start of this writing, mention was made of interrupted cuts, one of the headaches of this war production. Interrupted cuts result in multiple shocks; on the drive, as the work springs back, and on the tool, as it re-engages the cut. This is tough on any tool, and especially so on carbides.

The answer lies in the use of negative rake tools in combination with other things, notably adequate tool support. Where the gap is not too wide, negative rake tends to bridge the cut, so that the "heel" engages the opposite side while the point is still cutting. Even where such bridging is not effected, the fact that the load comes on the heel, not on the point of the tool, tends to eliminate tool breakage.

Negative rake has been previously described in *THE TOOL ENGINEER*, but it may be well to say that a rake of 25° is not extreme and will work nicely with properly correlated side and top clearance. A typical example of "bridging" with a negative rake tool is shown in Figure 7.

A surer way to bridge interrupted cuts is with multiple cutters, unevenly spaced — as, 3, 5 or more odd blades. A simple tool, with adjustment, is shown in Figure 8. This tool, incidentally, can be used with piloted bars, as illustrated by dot-and-dash lines.

For facing on interrupted cuts, a negative rake tool as in Figure 9 works nicely. While the illustration shows

three blades, two opposed or even a single blade tool will work if the gap can be bridged with cutters set at 15° angle, which is recommended for facing. This negative rake, on facers, has a further advantage when used on vertical spindles; the angle of the blades has a tendency to sweep the chips clear of the work instead of loading up ahead. You know, the way millstones work.

Figure 10 shows another way of making a multiple boring tool, in which each cutter is independently adjusted. This tool is easily made, yet, is so unconventional that the conservative designer may reject it as impractical. It's anything but impractical, on the contrary, has decided points in its favor.

Refer to Figure 11, and we'll treat both in the one bracket. Note the angles at which the tools are set, which tends to put the load of cut along axis of bit, instead of crosswise as in conventional practise. If set at 30° , this means that, to all practical purposes, a $\frac{3}{4}$ -inch square bit assumes a cross section of over $\frac{7}{8}$ -inch.

Furthermore, as shown in Figure 11, the construction permits a separate cutter head which may be slipped on to a small bar. This effects a very decided saving in material, as where a long bar would be required for, say, a turret lathe tool set-up.

Simple Tool Support

A very simple but efficacious tool combination is shown in Figure 12. This, incidentally, can be substituted for the design shown in Figure 3. Both cutters can be alike, or one can be a counterbore, the other a chamfering tool or even a facer, and each is independently adjusted.

Concluding the illustrations, Figures 13 and 14 show simple means for tool support. Note that the one has a welded support, while the other is milled, first turning the blank so as to provide for support.

Naturally, the foregoing only scratches the surface of boring operations, yet, the designs shown provide for such wide applications, not to say variations, that they merit a distinct place in the literature on modern boring tools.

One pertinent comment may be added, however, and that is that, for finishing cuts, reamers are generally preferable to the single bit finishers.

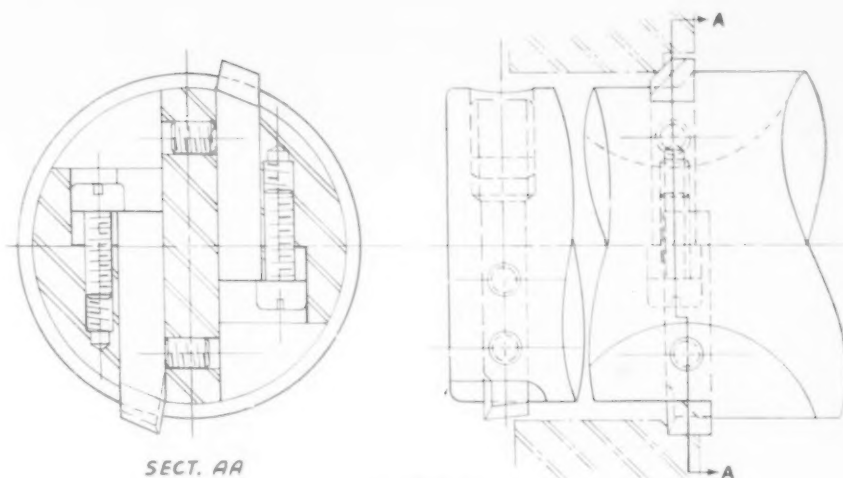


FIGURE 12.

That is, they are faster, and on the whole self sizing — *i. e.*, they'll repeat indefinitely until worn. On the whole, they'll work best when floated, although float is not essential where spindles are true and in alignment with guides.

Study the job, and design tools that combine maximum accuracy with

maximum productivity, yet, with a view toward economizing on labor and materials. And, time (and experience) permitting, go the whole way; one trouble is that too many people are satisfied with halfway measures. This is an all-out war that can best be won with all-out tools.

THE END

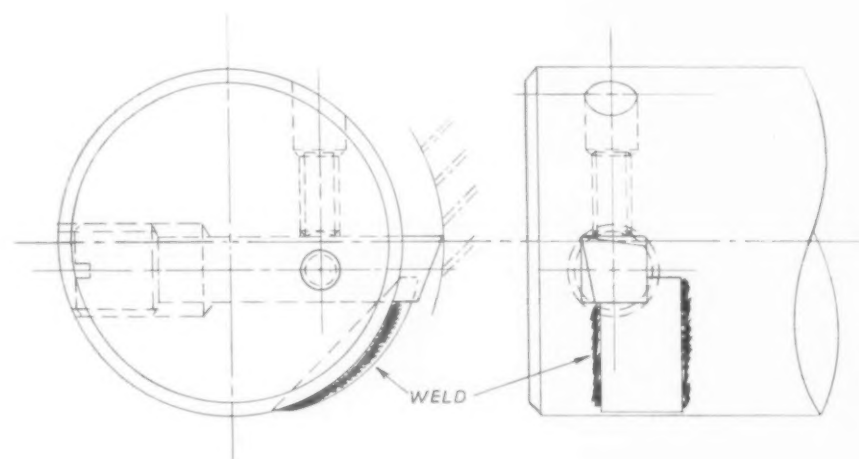
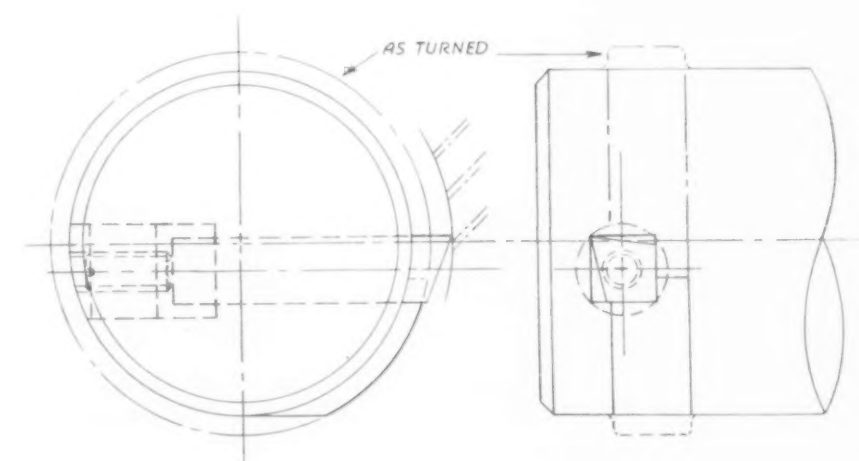


FIGURE 13 (above).

FIGURE 14 (below).





A few of the thousands of jigs and fixtures used on 1918 Browning automatic rifle production. Job was to figure out what most were used for.



Bramson Publishing Company Photos

Cutting bar stock into correct lengths for rear sight. Ground steel jig holds stock, permitting mass production operation on this machine.



To conserve high speed steel, this Small Arms unit is silver soldering cutters to old carbon steel shanks and arbors.

NEW ENGLAND Small Arms Corporation

JEROME S. WILFORD

NEARLY a quarter of a century ago, several thousands of fixtures, jigs and gages, used in building the Browning Automatic Rifle were packed in oil and sawdust at the Springfield and Rock Island Arsenals. By and large, they were well preserved.

Came 1942, the rapid firing Browning, with refinements, was called back to service. Firing cartridges in clips of 20, about as fast as a machine gun, it was by no means a back number. A heavy gun to carry in 1918, it could do a better job than ever in 1942 with a mechanized army.

Who would build it? New England had already converted many of its fence-wire and screw driver magicians to arms manufacture, but there was a sub-contracting organization that might better be doing such an entire job than building small arms parts. That group, consisting of a sporting goods manufacturer, a loose-leaf notebook company, a silverware concern and several other diversified organizations, was contacted. Agreeing to do

the job, the companies became partners in the New England Small Arms Corporation.

From each company, one or two top engineers were selected to form a pool of engineering talent. Sitting around a table, they spread the components out, and proceeded to find out what each man thought he could do best. Parts were passed back and forth, hasty sketches were made. There was all kinds of work to be done — deep-

hole drilling a barrel, 160 operations on the receiver, precision finishing the sights.

One member company took the rear sight job — one of 80 parts that it agreed to build. Most of the jobs that it took were suited to its experience and its equipment which was heavy on the screw machine and spring production side. Its work today exemplifies the ingenuity shown by the firms comprising the war-time corporation.

The rear sight was one job, however, that nobody was anxious to tackle. It seemed that this part of the gun might better be produced by a manufacturer with experience in gun sights. But no such producer with available man-hours or machine time could be found. This company, with no tools that it knew it could use, except a couple of vises undertook production. As one of their engineers put it, "We didn't know we couldn't do it, so we went ahead."

As with most of the jobs, there were no tool designs, little tieup between components of the gun and any of the

"WE DIDN'T KNOW WE
COULDN'T . . .

So we went ahead." That's how one of the companies, a paper products manufacturer, in the Small Arms Corporation went ahead to build the rear sight for the Browning rifle.

This is a story of Yankee ingenuity and Tool Engineering.

On the rear sight, the slide carrying the aperture can be adjusted along the sight base by a rack about one-eighth of an inch wide which meshes with a screw in the base. Such a rack might be made by indexing a slitting cutter for each groove. But the engineers decided that was too slow. They constructed a fixture for hand tapping a one-eighth stub Acme thread. A lead screw ahead of the tap guides the tool. The work piece is held on its side to allow chips to fall free.

The slight radius in the rack has no effect on its efficiency. According to engineers on the job, the hand tool is about as fast as a machine tool designed for the job would be. Further, they believe that machine cutting might present a problem of an initial force that would tend to break or chip the narrow ridge of metal.

Stock for the slide is $\frac{5}{8}$ -inch square SAE 1112 bar, normalized and ground to size. Stock is cut into 7 $\frac{3}{32}$ -inch lengths. Four bars are placed in a toggle clamp—one of the reclaimed World War tools for which no purpose was discovered. The bars are ground to size simultaneously, and then held in a jig and sliced into ten equal parts by gang cutters.

Two young men in the tool room are rehabilitating the jigs and fixtures. When the job is completely set-up, they will run it, having a thorough knowledge of their operation. Some of the tools, cleaned of old chips still clinging to them, are ready for work. Others require machining. Some have been discarded altogether for improved

With sketching paper, backed by transfer side of carbon, works manager makes drawings from which blue prints can be made to get job started.



HOW A NEW TYPE OF POOL WAS FORMED

On Equal Footing, a Group of New England Manufacturing Companies Combine Engineering and Administrative Skill to Produce Rifles

FORMATION of the New England Small Arms Corporation offers material for an interesting chapter on the conversion of industry to war production. It is the result of starting out to meet a problem halfway and winding up with the problem licked and a few other things accomplished to boot.

Back in September, 1941, Herman Moe, administering the engineering department of a nationally known organization, was given the job of procuring sub-contracts on war production to occupy the facilities of the company. Among the stipulations set forth by the president of the company were that the sub-contracts should preferably be for gun parts and that the parts must be for guns of American manufacture only. Mr. Moe set out to sell his company and facilities with the result that he successfully negotiated with the oldest gun manufacturer in the United States. In fact, he was successful to the point of overselling his plant's capacity.

It became necessary to organize a sub sub-contract group to obtain the required production facilities. While getting this pool into operation, organizer Moe heard many complaints from New England manufacturers who felt that more armaments business should be coming their way. There were it seemed too few large dollar volume contracts coming to nearly hundreds of plants whose peace-time production was in paper products, sporting goods, silver ware, clocks, office equipment and others of New England's myriad products.

MR. MOE had the thought that there was not, possibly, in many of these plants, as individual organizations, sufficient production facilities or engineering talent to attract the larger contracts. Possibly a combination of facilities would produce the desired results. A number of larger New England manufacturers were contacted and after several meetings, a new type of pool was born, probably the first of its kind in this country. Previous pooling has been along the lines of a large prime contractor soliciting the assistance of several smaller manufacturers to enable him to complete a project, much as was the case with the sub sub-contract pool which Moe first organized.

The New England Small Arms Corporation consists of an administrative corporation whose directors are representatives of the several companies in the pool. As a corporation, it is the prime contractor, and is set up to handle the affairs of the pool, mainly a matter of negotiating the contracts and adjusting or arbitrating the administrative and engineering problems of the pool.

ENGINEERING problems of the group are overcome at meetings of engineers representing each company. In this way, an all around experience and body of talent has been assembled for application to the problems of manufacturing the Browning rifle. It has been done with efficiency, and a resultant saving of cost to the companies and to the country.

set-ups. A snap gage for sight inspection of length and end radius of the front sight key has been replaced by a go and no go female block which does a much better job of verifying the conformity of the sides and radius.

Some snap gages were found to be as much as one-eighth of an inch oversize. These have been built up with Stellite. Less worn surfaces, up to .002 or .003-inches, are built up with hard chrome.

The metal cutting division of the company — a typical old New England mill — has been brightened with fluorescent lights and new machines operated by girls in sweaters and slacks. The company, 99 years in business believes common sense answers many of the problems of war production. Any ancient tool is kept that will do a job and relieve time on a new one.

A 35-year old Acme 4-spindle screw machine is turning down the eight-inch pin for the recoil spring guide.

At the same time, they are making full use of such new ideas as hard-chrome plating. They are also making space on old factory floors that were piled with years' accumulations of junk, for such new machines as they must have to do the job. Production is



One of World War tools for which no purpose was discovered is used as jig to hold bar stock during grinding into four rear sight slides.

departmentalized by machine operations because of the diversified job requirements.

Conserving high-speed steel, cutters are being silver-soldered to carbon steel arbors. Their experience with

this is that the less clearance there is between cutter and inserted shank, the better. About .002-inch is allowed. One of the important requisites, of course, is that the parts be thoroughly cleaned. Carbon tetrachloride is used in this instance. Silver's low soldering — or brazing-point, 1100° F. is not high enough to draw the heat from the tool.

Doing the best with the tools they have or can get, this company, like the other partners in the New England Small Arms Corporation, is pushing to produce all the gun parts it can today. They figure that is more important than waiting for the perfect method that may produce more next year.

The works manager leads the march against time. Back at his desk after supper, he sketches the solutions to the day's unsolved problems. With ordinary sketching paper, backed by carbon paper with the transfer side against the other side of the sheet he is working on, he makes free-hand drawings from which working prints can be made. They will show what's needed to keep the job going. Meanwhile, draftsmen can scale up finished drawings. THE END.

CARBIDE TIPPED REAMERS

Their Advantages and Uses

GEORGE HERRICK

TOOL ENGINEER
WENDT-SONIS COMPANY

BECAUSE of their variety of uses, and because of their advantageous results, tungsten carbide tipped reamers have become of major importance in today's battle of production.

Realizing that carbide tipped reamers can increase production as much as 500 per cent, many industries have selected the reamer for this speed-up factor. Speed is not the only advantage.

Carbide tipped reamers will ream materials much harder and tougher than those that can be reamed with ordinary high-speed and carbon steel.

Since carbide tipped reamers will also hold their size and stay sharp

longer than those made of softer materials, this results in a saving of time in setting up and sharpening.

Where can carbide tipped reamers be used? They can be used practically anywhere and on practically any application where a reamer is used to do the job. In numerous cases they can be used to advantage on tougher jobs where they will hold up for a longer period. Regardless of material there is also the fact that carbide tipped reamers give a much higher finish and allow the operator to hold closer tolerances than he could possibly hold with high-speed or carbon steel reamers.

This often eliminates a third boring operation which, in turn, definitely helps to increase production.

As we all know, aluminum, brass, bronze and copper have a great tendency to build up on any cutting edge, thereby marring the finish of the hole and rapidly dulling the tool. This necessitates frequent sharpening of the reamer and consumes a great deal of time. Carbide tipped reamers are especially suitable for reaming these non-ferrous and highly abrasive materials mentioned above, because their use will reduce the build-up to a minimum. The reason for this is that the

THE TOOL ENGINEER

carbide cutting tip is much harder, finer grained and therefore less porous than the various types of high speed steels.

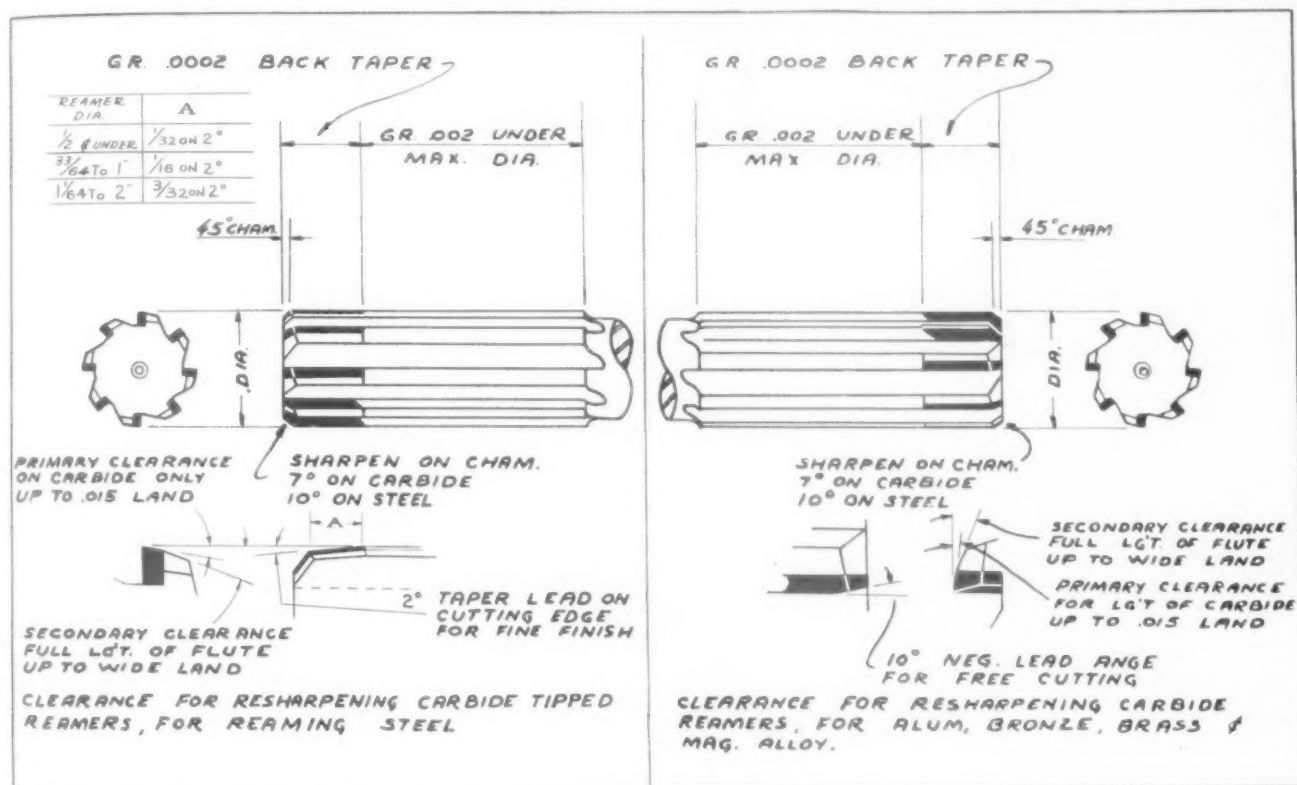
Contrary to most carbide cutting tool applications, it is not necessary to run carbide tipped reamers at excessive feeds and speeds. In fact, better performance is usually obtained by more moderate speeds. Naturally the number of surface feet and feed required will vary with different types of metals for the reaming operation. For example, when reaming steel armor plate with a carbide tipped reamer, a safe speed to use is between 80 and 120

feed remains practically the same. In one operation carbide tipped reamers can very often remove .010 to .020 stock from steel hardened to 50 and 55 Rockwell "C". With high-speed steel reamers two or three such operations would be necessary to remove an equal amount of stock.

While it has been the general opinion that cemented carbide tools must be used only in new machines or those that are very rigid, this theory does not apply to carbide tipped reamers. This is because the reamer will be guided to the hole through a hard bushing, thus the spindle run-out is of little or

carbide tipped reamers they necessitate only a few simple rules for best results. Since the carbide tip is very hard, it is also brittle. Therefore it should never be placed in a chuck or any type holder and tapped on the cutting end with a hammer or any hard object. Although minute chips in the carbide cutting edge are not detectable with the naked eye, they will affect the finished work by leaving thread lines or score marks.

Another safeguard rule pertaining to carbide tipped reamers is that they should never be taken from a holder and laid carelessly on the machine



surface feet per minute with approximately .003 to .005 feed. However, when reaming non-ferrous metals such as aluminum, bronze, brass and copper the speed can be upped to 225 or 250 surface feet per minute with feeds ranging from .003 to .008 depending upon the type of finish desired.

With ordinary cast iron, using carbide tipped reamers, moderate feeds and speeds will prove as satisfactory as either excessively high or low feeds and speeds. Where carbide tipped reamers 1/4 inch or less in diameter are being employed, it is necessary to reduce the surface feet per minute suggested for the various metals, but the

no significance. And as mentioned above, any lathe, radial or vertical drill press will produce enough surface feet to justify using a carbide tipped reamer on the job.

As for coolants and lubricants, any that can be used in high-speed reaming operations can also be used effectively with carbide tipped reamers. The coolant most generally used is ordinary soluble oil. In many cases, however, no coolant or lubricant is necessary. It should always be remembered that when a coolant is used, it must be used amply or it is better not to use any.

For the dependable, long life of car-

table or work bench where they might come in contact with some hard metal which would injure the cutting edge. The safest and easiest way to protect a tipped reamer is to wrap the cutting end with masking tape or a similar substance.

Look around your plant today. If you find any jobs—either easy or tough—where a reamer is being used, or where one can be used, try a carbide tipped reamer on that job. You'll not only find that it increases production but it will also save the most needed, the most vital item of our all-out war effort — TIME!

THE END



Ex-Cell-O Photo

How to Select the Right Grinding Wheel

H. J. WILLS

ENGINEER
THE CARBORUNDUM COMPANY

This is the first of two installments on selecting grinding wheels. The Production Data Sheet, giving specifications for wheels on centerless grinding, is included elsewhere in this issue. Next month a Production Data Sheet on internal grinding will accompany the concluding installment of this article.

GRINDING WHEELS are made in nine standard shapes, of two types of abrasive material, 31 grain sizes and numerous combinations of grain sizes, five different bond materials, 17 grades or degrees of bond hardness, and numerous structures. Each type of abrasive can be had in several variations from standard to give special cutting characteristics, and some of the bond materials can be varied for special purposes.

Obviously, thousands of combinations are available, some one of which is nearly certain to be suited to any job. It is important to select just the right wheel if high production, low cost and proper quality of work are to be achieved.

The only sure way to select a wheel is by test, under actual operating

conditions. But it is obviously impossible to test all of the possible wheels, and undesirable to have to test more than half dozen or so. Fortunately, an understanding of how a wheel works and of the characteristics of various wheels, makes it possible to narrow the choice.

▲ The nine standard shapes are shown in Figure 1. Type 1 straight wheels are used for cylindrical, centerless, surface and internal grinding, for cutting-off and for snagging and billet grinding.

Type 2 cylindrical wheels are chiefly used for surface grinding, on either vertical or horizontal spindle machines.

Type 4 wheels, tapered both sides, are used mostly for snagging, although

they are sometimes used for general grinding.

Type 5 wheels, recessed on one side and Type 7, recessed on both sides are used for the same jobs as straight wheels. The recesses are to give clearance for the mounting flanges. Some new machines are especially designed for these wheels.

Type 6 straight cup wheels are chiefly used for surface grinding. They are also used for off-hand grinding of tools and other parts where it is undesirable to have a curved surface, as it would be if the grinding were done on the periphery of a straight wheel. To avoid the arc, the work is held against the grinding face "W".

Type 11 flaring cup wheels are used largely in tool grinding and in the foundry for snagging.

Type 12 dish wheels are used mostly in the tool room. Their shape and thinness permit the grinding edge to reach narrow places.

Type 13 saucer wheels are used for resharpening saws, the operation known as "saw gumming".

Types 3, 9, and 10 are not shown because they are no longer standard shapes.

Type 1 straight wheels may be had with the standard face contours.

▲ In addition to these standard wheels there are hundreds of shapes and sizes of mounted wheels and points, some of which are used in internal grinding.

Obviously, the shape and size of wheel to select is determined by the nature of the work — as tool sharpening, cylindrical, internal — and by the design of the machine — as in surface grinding, which can be done with either straight or cup wheels, depending upon the machine design. The diameter of the wheel is to a considerable extent determined by the size of the machine, and the width of the grinding face by the size of the work and design of the machine.

The ideal grinding wheel will be "self-sharpening" under the conditions of the job on which it is used. That is to say, as the abrasive grains dull they will break and present fresh sharp edges to the work. This continues until the grain is practically used up, when it will be torn from the bond and new grains set to work at cutting.

This self-sharpening action is dependent upon the stresses set up in the wheel face. If the stresses are in-



Delta Photo

"It is important to select just the right wheel if high production, low cost and proper quality of work are to be achieved."

sufficient, as when removing only slight amounts of stock in order to secure great accuracy of dimension or high surface quality, it is necessary to "sharpen" or dress the wheel.

In the same way, a "hard" grade of bond will hold the grains longer under a given stress than will a "soft" bond. In fact, a good definition of "grade" is, "The holding power, or strength with which the bond holds the abrasive grains in place."

The stresses in a wheel face are due (1) to the movements of wheel, work and machine; (2) to the nature and amount of contact between the wheel and the work; (3) to the characteristics of the work material.

If the wheel speed is increased while all other movements remain constant, the wheel will act harder. This is because at higher speeds more abrasive grains will act on the work in a given time, which decreases the stresses which tend to tear the grain from the bond. Under the same constant conditions, if the wheel speed is decreased, the wheel will act softer.

To increase the speed of any one of the work movements, all others and the wheel speed remaining the same, will cause the wheel to act softer, and vice versa. This is because at higher work speeds more material is presented to the wheel in a given time.

Some unsatisfactory and uneconomical grinding is due to failure to

understand, and take steps to off-set, these effects of speed changes. Thus, as a wheel wears, its diameter and hence its peripheral speed decreases and the wheel acts softer. This can be easily overcome by increasing the spindle r.p.m. to bring the peripheral speed in s.f.p.m. up to standard.

Sometimes a wheel that is of the wrong grade — bond hardness — must be used, either because it happens to be the only one available for a special job, or because it was not the one that should have been selected in the first place. Within limits it is possible, by considering the effects given above, to manipulate a wheel that is not too far off so as to give the desired action.

However, it is seldom economical for an operator to "baby" a wheel in these ways. The best results are achieved when the wheel and work can be operated at the most efficient speeds.

The area of contact between the wheel and the work is the product of the length of the arc of contact and the width of the wheel face. The size of this area affects action in two ways.

If the contact area is large, or increased, the total stresses between wheel and work are divided among a larger number of abrasive grains. The stresses acting upon each grain are therefore less and the wheel acts harder.

It is evident that the longer the arc of contact, the farther will the chips have to be carried through the contact area.

In cylindrical, centerless and internal grinding the arc of contact is directly proportional to the in-feed, the work diameter, or the wheel diameter, provided the other two of these conditions remain constant. In internal grinding the arc is, for the same wheel and work diameters, much longer than in cylindrical or centerless grinding.

On horizontal spindle surface grinding machines using the periphery of a straight wheel, the effect of changing the wheel diameter or the in-feed is the same as for cylindrical grinding. For a wheel of given diameter the arc of contact will be longer in surface grinding than in cylindrical or centerless grinding, but less than in internal grinding.

In surface grinding with the edge of a cylinder or cup wheel, the area of contact will vary with the diameter of the wheel, the thickness "W" of the grinding face, and with the size and shape of the work being ground. Since there is no arc of contact when using cylinder or cup wheels, the area of contact is unaffected by in-feed.

TO BE CONCLUDED

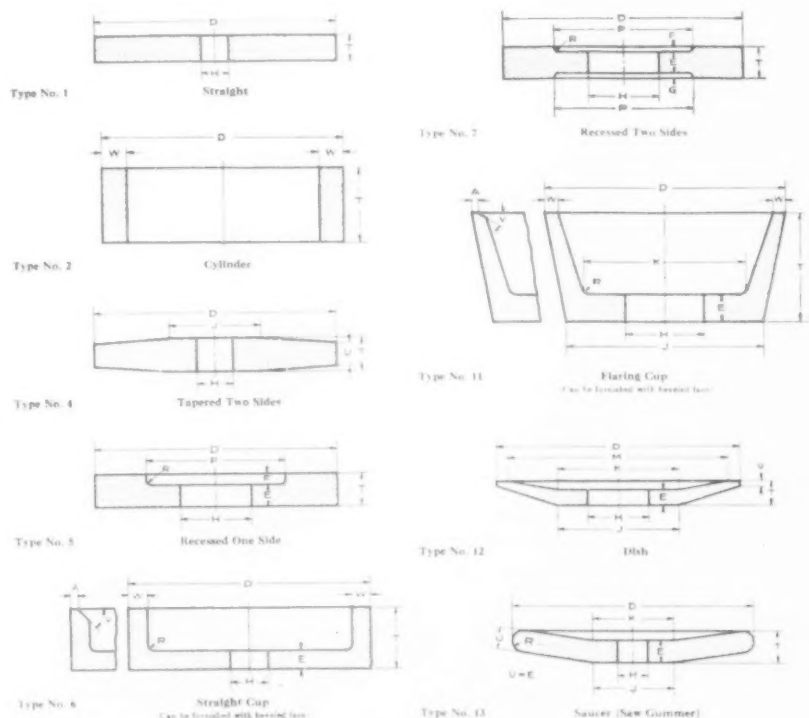
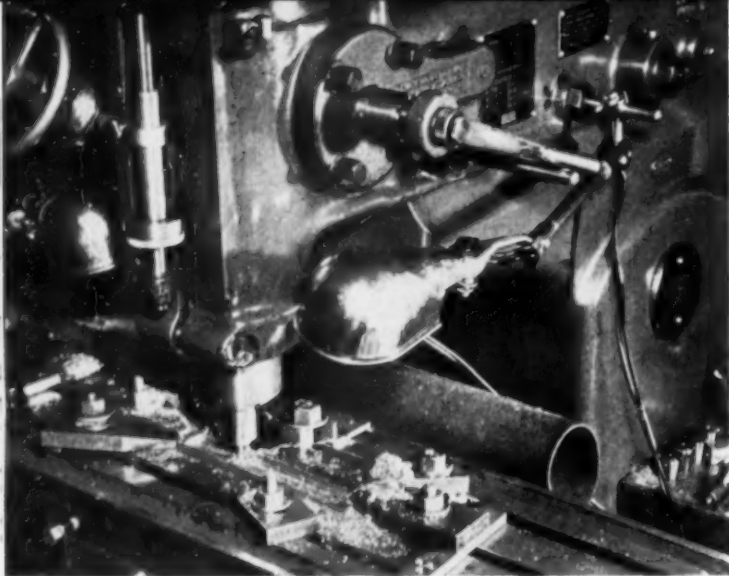


FIGURE 1.



Gorton 9-J Super-Speed Vertical Miller.

Milling Cutter Power Requirements

O. W. WINTER

PRESIDENT
AMERICAN SOCIETY OF TOOL ENGINEERS

Second and Final Installment

HOW TO USE THE CHARTS

A. Unknown Factor—Feed Permissible.

- Known Factors—
1. Material being milled
 2. Type of cutter to be used
 3. Power rating of milling machine
 4. Width and Depth of cut
 5. R.P.M. of cutter
 6. Number of teeth in cutter
 7. Products of No. 5 and No. 6
 8. Efficiency of the milling machine.

DIRECTIONS:

1. Select proper chart for material and type of cutter under consideration.
2. Deduct 10% to 20% from the power available at the machine to obtain power available at the cutter.
3. Locate the figure obtained in No. 2 on the horsepower (lower right horizontal) scale.
4. Sight vertically to where a perpendicular line from this point would intersect the inclined line representing the number of tooth contacts (products of rpm and number of teeth in cutter).
5. From this point sight to where a horizontal line would intersect the inclined line or curve representing the width and depth of cut.
6. From the latter intersection point sight vertically to the feed (lower left horizontal) scale and read the feed in inches per minute allowable.

NOTE: If a gang of cutters is to be used and the allowable feed rate is desired, proceed as follows:

1. Two cutters.

Figure the feed rate allowable if the total power were available for cutter No. 1, call this feed A. Repeat for cutter No. 2 and call this feed B.

The exact formula for the feed rate is:

$$F \text{ equals } \frac{AB}{A+B}$$

EXAMPLE—Material Cast Iron.

Suppose 5 HP was available to the machine and that 20% was lost before reaching the cutter. In other words the machine was 80% efficient. There would be 4 HP delivered to the cutter.

Cutter No. 1 is a spiral slab mill having 10 teeth and running at 47 rpm and the cut is 3" wide x 1/8" deep. Chart No. 9 shows that 4 HP could feed this cutter along at 17 1/2"/min.

Cutter No. 2 is a half side mill having 24 teeth and also running at 47 rpm. The cut is 1 1/2" wide x 1/4" deep. Chart No. 6 shows that 19" feed could be taken if this cutter were acting alone.

Therefore in this example A is 17 1/2 and B is 19. Substituting in the formula we have:

$$\frac{17.5 \times 19}{17.5 + 19} = \frac{332.5}{36.5} = 9.36 \text{ inches per min.}$$

17.5 + 19 equals 36.5 equals 9.36 equals allowable feed

Proof of this formula follows:

HP equals Total power available.

x equals Power required by cutter No. 1

y equals Power required by cutter No. 2

F equals Allowable feed rate for both cutters

A equals Allowable feed rate for cutter No. 1 alone

B equals Allowable feed rate for cutter No. 2 alone

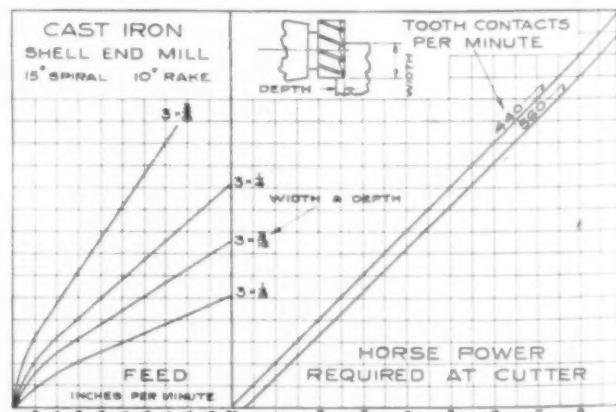
a equals Cutting condition constant for cutter No. 1

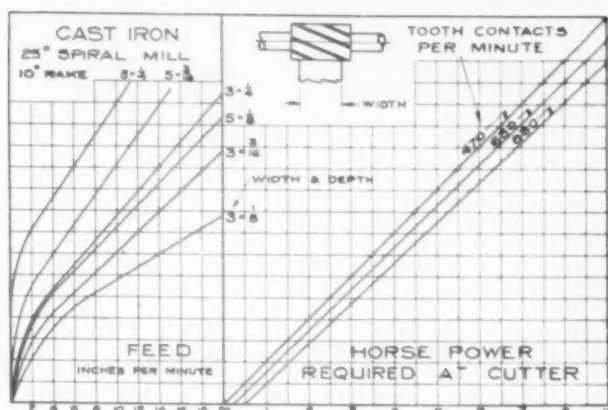
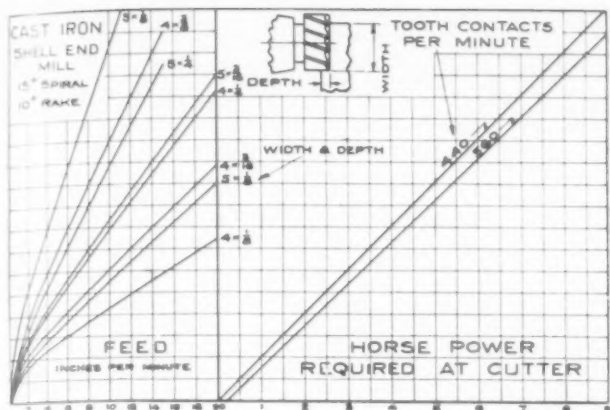
b equals Cutting condition constant for cutter No. 2

$$1. \quad x \text{ equals } Fa \quad a \text{ equals } \frac{x}{F}$$

$$y \text{ equals } FB \quad b \text{ equals } \frac{y}{F}$$

$$2. \quad \text{HP equals } x+y \quad \text{equals } F(a+b)$$





3. HP equals Aa a equals $\frac{HP}{A}$ and A equals $\frac{HP}{a}$

HP equals Bb b equals $\frac{HP}{B}$ and B equals $\frac{HP}{b}$

4. Therefore A equals $\frac{x}{F}$ equals $\frac{HP}{A}$ and b equals $\frac{y}{F}$

equals $\frac{HP}{B}$

5. $A-B$ equals $\frac{HP}{a} + \frac{HP}{b}$ equals $\frac{HP(a+b)}{ab}$
 equals $F^2 HP \frac{(x+y)}{F F}$
 equals $F HP \frac{(x+y)}{xy}$
 equals $\frac{FHP^2}{xy}$
 equals $\frac{xy(A+B)}{HP^2}$

As F equals $\frac{HP}{A}$ Also F equals $\frac{HP}{B}$

x equals $\frac{HP F}{A}$ y equals $\frac{HP F}{B}$

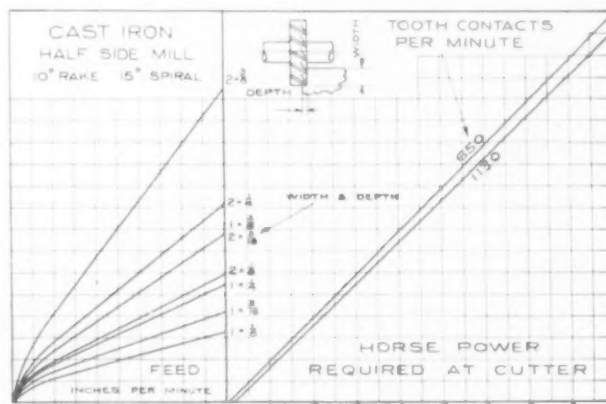
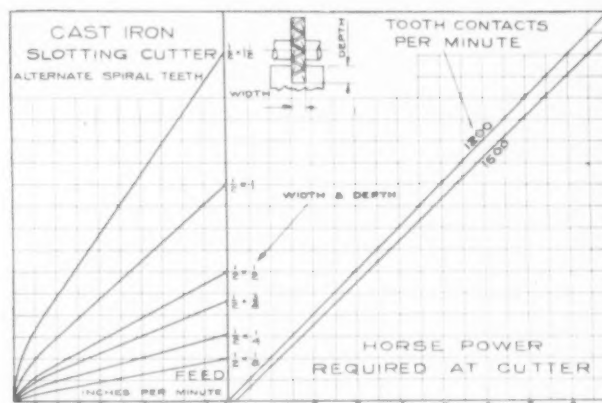
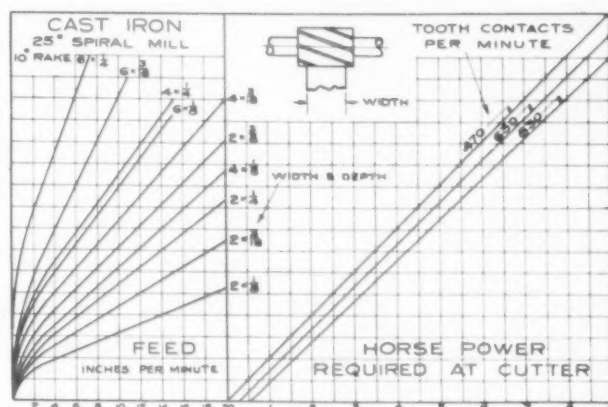
Therefore

F equals $\frac{HP^2 F^2}{AB(A+B)}$

equals $F^2 \frac{(A+B)}{AB}$

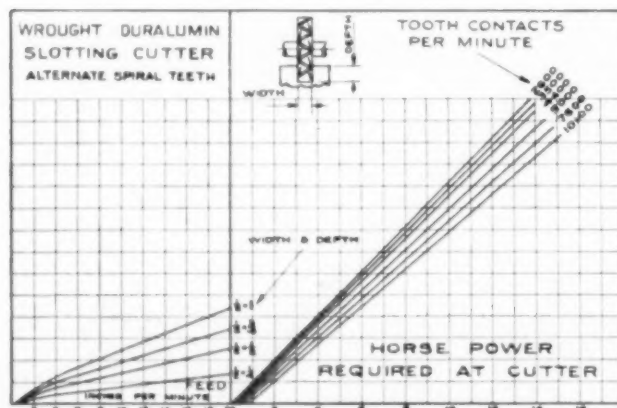
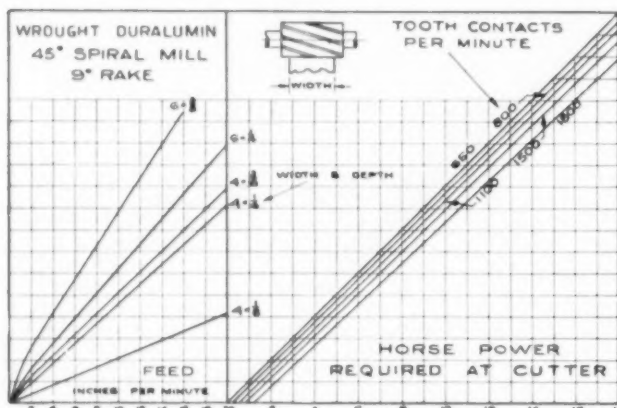
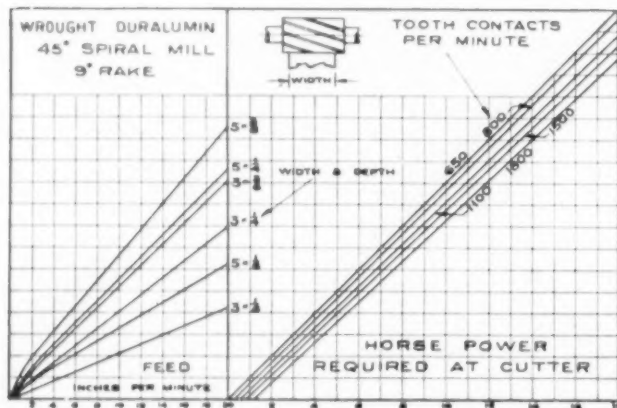
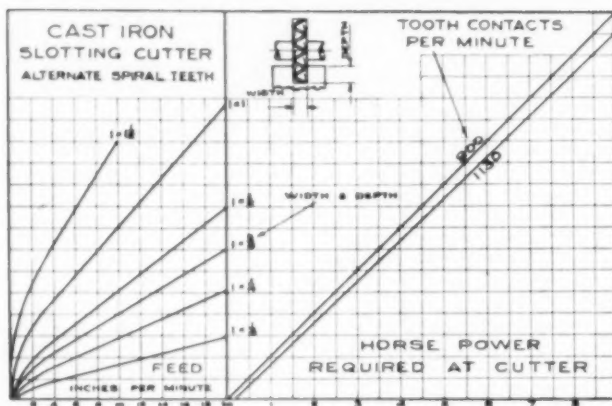
$\frac{1}{F}$ equals $\frac{(A+B)}{AB}$

Proving F equals $\frac{AB}{(A+B)}$



2. Three or more cutters.

Figure as for two cutters the feed rate allowable for each were it working alone. The allowable feed rate for the group working together is approximately expressed by



the

formula— F equals $\frac{A+B+C}{n^2}$ etc.

1. A, B, and C represent the allowable feed for each cutter acting were it alone. One figure is needed for each cutter cutting at the same time.

2. n, equals number of cutters cutting at one time and represented in the numerator of the formula.

Another way to determine allowable feed rate is to assume a certain feed and determine the total horsepower required. The correct result should be obtained after two or three tries.

Note also that if any cutters in the group are identical as to the number of tooth contacts per minute and the width and depth of cut they are taking they may be assumed as one cutter. In this case the allowable feed rate for all identical cutters would be that for any of them divided by the number of these identical cutters. After this preliminary calculation is done figure for the rest of the cutters as explained above.

This may make some gangs of cutters actually containing more than two cutters be figured nevertheless as such, take the previous example for instance. If there had been 2 half side mills in the gang, the allowable feed instead of 19"/min. would have been 9 1/2"/min. for the pair. The substitution in the formula then becomes

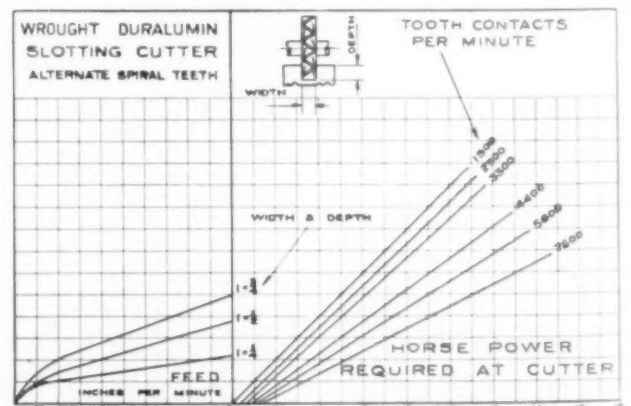
$$\frac{17.5 \times 9.5}{17 + 9.5} \text{ equals } \frac{166.25}{27} \text{ equals } 6.15'' \text{ min. feed allowable}$$

B. Unknown Factor—Power Required.

In order to obtain the power required for any given feed under any set of conditions the procedure would simply be reversed, that is as follows:

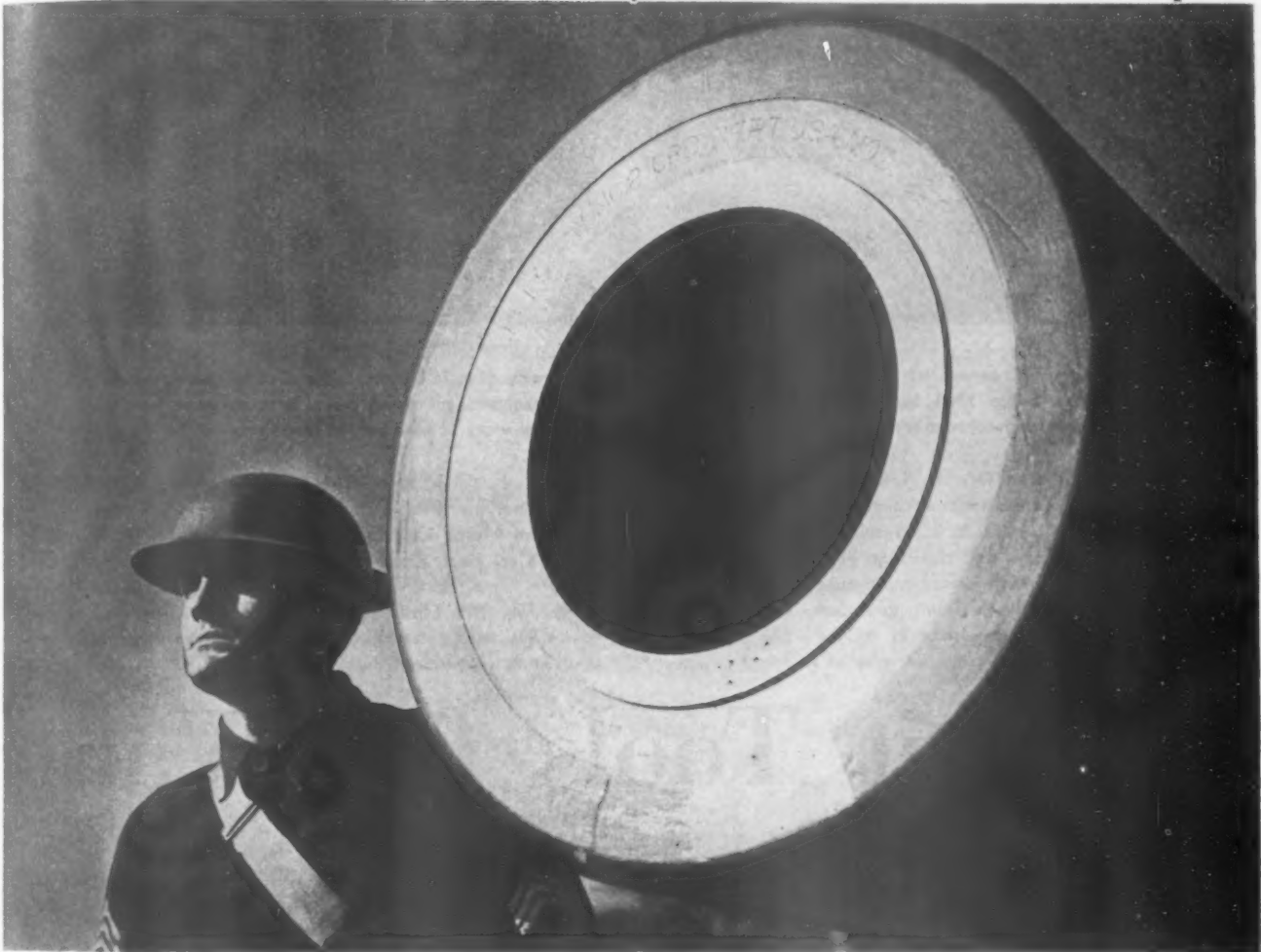
1. Select the feed on the feed scale and trace vertically to the intersection with the size of cut diagonal line or curve.
2. From this intersection point trace horizontally to the right to the intersection with the diagonal representing tooth contacts per minute for the job under consideration.
3. From this intersection point drop down to the scale representing horse power required of the cutters.
4. The total horse power required for a gang of cutters would be the sum of the power required for each individual cutter.

THE END.



WAR PRODUCTION CONFERENCE

AMERICAN SOCIETY OF TOOL ENGINEERS
SPRINGFIELD, MASS. • OCT. 16-17



O.E.M. Photo by Palmer

IN AN ATMOSPHERE fraught with the seriousness of war, 825 members of the American Society of Tool Engineers gathered in Springfield, Massachusetts, October 16 and 17, to ponder the broad problems of manpower, tooling and materials substitution.

Burdened with much of the responsibility of achieving ultimate victory on the production front, members of the Society left important work in war production factories in many states east of the Mississippi River and from as far west as Houston, Texas, and San Diego, California, to attend the organization's semi-annual conven-

(Continued on page 109)

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By A. E. CLARK **PAGE 82**

TOOLING THE WAR MACHINE THROUGH

E.S.&M.W.T. By S. J. HOEXTER **Page 85**

WOMEN IN WAR INDUSTRY

By ARNOLD THOMPSON **PAGE 87**

TRAINING THE AVAILABLE LABOR SUPPLY

By THOMAS O. ARMSTRONG **PAGE 90**

TOOL CONSERVATION

By ARTHUR A. MERRY **PAGE 93**

NEWS OF THE CONFERENCE **PAGE 103**

PICTURES FROM THE CONFERENCE **PAGE 104**

THE GREATEST GIFT IS AN OPEN MIND

By THOMAS H. BECK **PAGE 106**

Subsequent Issues will carry other equally interesting papers presented at the Conference.



Automotive Council for War Production Photos

A meeting of directors of the Automotive Council for War Production in Detroit. The Council was founded on New Year's Eve, 1941, by a group of men who had been competitors all their lives. Its purpose was to combine talents and resources for the common job of winning the war. It pledged its ingenuity to the nation.

Shown in photo, left to right: George W. Mason, president, Nash-Kelvinator Corp. and treasurer of the Automotive Council; B. E. Hutchinson, vice-president of Chrysler Corp. and chairman of budget committee of ACWP; George Romney, managing director of ACWP; Paul G. Hoffman, president of Studebaker Corp. and a vice-president of ACWP; (back of Mr. Hoffman are Art Butler, manager of military vehicles

division of ACWP and James Cope, Washington Reporting Service of ACWP); V. W. Fries, vice-president of White Motor Co.; Edsel Ford, president of Ford Motor Co.; Karl Ammerman, vice-president of Borg Warner Corp.; E. A. Clark, vice-president of Budd Wheel Co. Mr. Hoffman presided in the absence of Alvan Macauley, chairman of Packard Motor Car Co. and Council president.

Detroit Tools for War

ELMER A. CLARK

VICE PRESIDENT, BUDD WHEEL COMPANY
MEMBER, BOARD OF DIRECTORS
OF
AUTOMOTIVE COUNCIL FOR WAR
PRODUCTION

ONCE three thousand visitors a day came to Detroit to see automobiles put together. Some came in turbans, others in boots. There were sailors off ships and cattle-raisers from the Argentine. Young women in slacks and old women in shawls. They looked on in amazement and uttered words about giants and miracles and went their way. Detroit would like to see those people today. It would hire every last one of them and make giants of them all if it could. For Detroit is busy with a new show now and manpower to run it is short.

In January and February of this year still other visitors came. These were not sightseers. But they were amazed. Amazed that a giant and a worker of miracles was spending his days over drafting boards gazing at odd-looking parts instead of shipping tanks and guns and planes by the

thousands the day motor cars ceased building. Investigators came and politicians and writers to learn whether this was Detroit-the-Dynamic or Detroit-the-Dormant. Even a playwright came. For there was a dramatic feel to the air in Detroit. Something America had lived by for forty years was gone. An era was ended. Here was a story.

But the real story was not the desolation of snow-fields piling up with the black hulks of presses and tangled paint ovens and old conveyor lines. Nor even the 125,000 men sitting idly at home waiting for their jobs to open up. It was rather the story of master mechanics and superintendents and

plant-lay-out men, method-men and tool designers and toolmakers, the men who bridged the chasm from peace to war and paved the way for the automobile industry to handle one-sixth of this nation's war production. They were the brine that saved the hide.

When Pearl Harbor's radio flashed news of the Japanese attack on that Sunday in December the message decoded itself into a personal meaning to every man alive on this planet. It spelled out hope to the starving Poles and the starving Greeks, because nothing could happen to make their lives worse. It hung the badge of mourning on the homes of three thousand American sailors and soldiers. It blazed the word Unity across this nation. But to the men who tool Detroit it said, "Get going!"

Just how large an order did Pearl Harbor radio to Detroit that Sunday?

No American can sense today the immensity of Corregidor rock by the number of cubic yards and, likewise, no man can read a scale up to billions in measuring Detroit's job. Reduced to terms of motor cars, which we do know, the message said this:

"As to the war goods, costing more than a million cars, which you shipped on the side, while making your regular run of automobiles in 1941, forget it! It may have been the equivalent of all you built for the first World War, but still forget it!"

Washington placed orders with Detroit before Pearl Harbor equal to a record year car production. Within three weeks the job was doubled to two years' work in ordinary times. By February, double and a half. Today, over triple the best car year and that in terms of shells, planes, tanks, guns, boats, engines, bomb-sights and the million forms of waste it takes to feed a war.

But can we be certain Pearl Harbor directed that message to the tool man? It could be to none other. Not to the plant builders, because there were square miles of buildings. Not to the paymasters, because there was money galore. Not to the production managers or the workers, because cannon doesn't come off fender dies. Pearl Harbor meant the Tool Engineers because all others must stand by until the hammer and the anvil are placed before them. Pearl Harbor meant an entirely new machine in Detroit.

Upon receiving this great command, did the tool man, in all his different forms, get out his clothes marked "Giant" and stencil "Miracle House" over his office . . . an office that he did not see for months? He did not! But today there are thousands of the rest of us who have painted those signs for him.

The most that was done for the Tool Engineer then was to honor him at an impressive but simple ceremony. He was decorated . . . decorated by burying him with tons of prints of strange parts that he had never heard of before. Management and labor gave forth wild shouts and urged him to speed up still faster because he was so behind with his work, hounded him to get through and get out of the way so that men who really knew how to produce could get going. "Finish that drum and we will show you how to beat it!"

America was in a deadly hurry.

With such encouragement as this, and because it was the only way of life he knew, the tool man landed and took command. There was nothing he did not dare and nothing he did not do. The playwright went home and the millwrights came in. They hitched their tractors to the stars and dragged them all over the place. For sixty days a turmoil like Dunkirk ruled the plants.

Machines, useless for war work, went to scrap, to vacant fields, to yesterday's competitors or to some boat builder down in the Louisiana swamps. Loading docks were torn out and seven foot boring mills set up in the corner of the press shop where the men's lockers used to be. Things were moving. Tools and parts were flying through the air by plane and by crane. The change-over could yet catch the spring demand . . . and it did. March saw the low point in men employed. April crawled. May higher. Higher again in June. And in July a new top figure in men working and dollar value in the history of Detroit. Every month since then a further new high has been set.

More than 300 War Products

Detroit's producers are again producing. They are producing . . . but only because tough mechanics took and held the landing beaches last winter. The few who work for the many came through. Were there fighters and soldiers in that performance? Was drama there for the playwright? There was and there still is! Especially for the playwright who can show men dropping from strain and fatigue, for the one who can show the creases and cracks that came in men's lives from the doing of it!

With thousands of separate contracts for more than three hundred distinct kinds of war goods all coming from one industry, how can talk describe all the individual accomplishments? There are incidents by the scores and the thousands to write into the detailed history. A single company has undertaken as many as one-hundred-fifty different war projects and engineering developments. Major concerns asked Washington to give them only the hard jobs and leave the less difficult ones for smaller plants with fewer engineers.

Foreign gun designs of five hundred parts were converted to assembly line methods with one hundred of the pieces revamped to stampings. Forty-nine hundred dies, jigs, fixtures, templates and patterns to make one plane wing. The man who could put all these deeds into one word would be the man to make a top die for Grand Canyon.

Where is the one great invention that has come out of this war preparation? There hasn't been one. But there has been in Detroit the rediscovery of an old device, an old universal tool that has been dragged forth before now in the face of disaster and only too often laid aside when the danger has passed. It was the simple reliance of one man on another when in trouble.

The thirty-first of last December was one of those murky winter days that often settle down off the lakes on Detroit. In the afternoon cars made their way about with headlights and street lights burned in parts of the city. It was no day for heroics or speeches about glory. In that atmosphere a group of men who had been competitors all their lives gathered to talk about their common job in the war.

Mr. Alvan Macauley, dean of the industry presidents, took his seat at the head of the table. There was C. E. Wilson, representing three hundred thousand General Motors stockholders and John Anderson who builds windshield wipers and claims three-hundred-thousand dealers sell them. Robert Black who makes ten-ton White trucks sat next to Joseph Frazer who builds Jeeps. Charles Davis, speaking for the job shops and the Automotive Tool and Die Association, sat between Edsel Ford and K. T. Keller. There were others, and, taken together, they represented the solid front of an entire industry.

Out of that meeting came a new name. The name was the Automotive Council for War Production. Morning papers on New Year's day published a letter sent the night before to the President of the United States and signed by that Council. It contained a pledge that this nation and her allies should not lack for one gun, one tank or one plane that the capacity and ingenuity of the automotive industry could produce. Month after month since that day this pledge has been in the process of redemption.

"Capacity and ingenuity to produce," these were the words. "Capacity" meant that every available machine, and the man to go with it, be set at war work. An inventory was made for the whole industry showing the description and the use of a quarter-million machines, both toolmaking and production. Idle equipment was offered for sale or lease to whomsoever could use it. Chrysler balanced out lines from the General Motors list. Ford built tools for Chevrolet. Parts builders helped life-time rivals fill the order they lost to the same plant a month before. A boring mill free for the week-end worked on somebody's casting from across town.

Independent tool shops reversed their process and hired their old customers to do special operations in pinches. Tool and equipment men walked freely about in the largest machinery warehouse ever to open its doors.

And what was done about "Ingenuity?" Far more than doors were opened there. Minds and secret chambers were unlocked. Telephones between plants became open confessionals. There isn't a private trick left in the industry today. Circulation of advice and short-cuts and special techniques and know-how between old-time competitors clogged the wires in efforts to get through until the Council had to start a young newspaper of its own to broadcast the news faster.

Conversion to war work was solely a problem of tooling. The proof of accomplishment is shown by today's production output. With the present rate

of increase from month to month, the automotive industry will, by December, be producing at twice its peacetime rate. For this the primary credit must go to the tool men. But next year's program calls for a further increase in production to the equivalent of three times normal. Still more tools will be needed but, with the co-operative spirit that has been developed, that goal, too, will be reached.

Getting Under Way

There has been high stimulation in the performance of the past year; stimulation, yes, but little comfort. For how can there be comfort in the face of this war's needs until the last plane has been tooled and built and dropped its load. The job is started but it is not finished.

But that job will be finished. This war will end as have all wars, through exhaustion if by no other weapon. Then what sort of a world will confront the tool man? A much smaller world, for one thing, and a poorer world than we have ever known. Patients die of shock quite as readily as from the accident that produces this shock and it will be shock with which we shall have to contend. There will be no all-clear siren with the end of armed hostilities.

The day following the laying down of guns will be quite as serious as the day before. Just as you were first in the conversion of this country for its own protection, so you will be first in the reconversion for what shall come after . . . and I hesitate to call it peace. Long before the public dreams of a

new model the tool engineer is busy and it is only proper he should give thought now to how he shall carry on.

Tools will be worn out. Men will be fewer. Skills such as yours do not grow in tank turrets. Such will be true to a large extent in our own country but how much more true in the world at large. And our present plight has shown that we can no longer disregard what goes on in corners of the globe we used to think remote from our lives. The future will call for world citizenship as well as devotion to the town of our birth. Today we can be grateful that a few tool men had the vision to venture beyond their own country's shores a few years ago.

Back in 1930 American Tool Engineers were in Australia, sharing their wealth of experience with the Australians, showing them the best we had in modern ways of doing things. A great many more were in Russia, helping develop a race of mechanics out of peasant farmers so that they could do for themselves. But for those hands at work now where would we be during our waiting time of getting ready? Where might we not be today had we done more of it for China, for South America, for India?

If we are seeing the value in today's help from what was done in the past, may we not prepare for tomorrow's protection by doing more? The tremendous masses of those populations are our future hope or our future downfall. Isolationism is a dead theory the world around today.

Take India. She stands today one of the big question marks before the United Nations. India that has been written into the fables for its riches! India, the prize of such worth that Columbus must discover America while trying to beat an ocean path to its gates!

When you leave the station on one railroad leading out of Detroit you pass acres piled high with strange looking gray scrap. Those piles are bones!

Automotive industry competitors visited each other's plants. Here are industry leaders viewing part of assembly operation on 75mm. gun barrel at Olds plant.

Left to right: D. E. Ralston, acting general manager of Olds; R. E. Griffin, production manager, Olds; Dan Eddins, general manager, Plymouth; John Dykstra, plant manager, Olds.

THE TOOL ENGINEER



Bones from India! White bleached bones of cattle that have been gathered off the Indian plains and raked up out of the bed of the Ganges. Natives received seven cents a day in wages for collecting them. Those bones are barged to tide-water and shipped through two great oceans half-way around this globe to Detroit. Later they are ground up and bought by Michigan farmers that their crops may be more generous. Rich India and rich Detroit! And the traffic between them is bones! Can a world peace stand on that footing?

But today, and out of Detroit, is coming a reversal of that traffic. A

man I know there, whose whole lifetime has been spent as one of the great master mechanics of the automotive industry, is handling the buying and dismantling of American sawmills for shipment to India where other Detroit master mechanics will re-erect them. And he has bought for India a boot factory and that will be knocked down and shipped. And likewise a plant for drugs and medicines which will be set up and operated as well by Americans.

The sawmill, the symbol of shelter, boots that the Indian may walk over rough places, medicine to guard his health and allay his fever . . . this is the mechanic's kind of speech to a

people in need. And a speech understood by every race on earth.

On the 15th of last February, Winston Churchill delivered a talk to the English people. He had just returned from America. He felt encouraged. "The Tide is Turning" he called his talk. In conclusion he raised his voice and spoke westward across the Atlantic to us. "Give us the tools," he begged. "Give us the tools and we'll finish the job." That cry was made in the midst of war. But whether in war or in the time to come after this war, that shall ever be the cry of humanity. "Give us the tools and we'll finish the job."

THE END.

Tooling the War Machine Through Engineering, Science and Management War Training

SAMUEL J. HOEXTER

SENIOR SPECIALIST IN
ESMWT COURSES

MANY MONTHS before the first shot was fired at Pearl Harbor, representatives of the Engineering Defense Training program asked the American Society of Tool Engineers to help in a study of what the engineering colleges could do to provide intensive training courses to meet the needs of government agencies and defense industries for specialists of college-level in engineering techniques.

We sought, during August of 1940, to learn by this means how many men would likely be demanded within the next year or so with engineering education in the machine tool field. Our letter of inquiry was circulated a month before the Selective Service Act and the President's Proclamation were promulgated on September 16, 1940, and two months before the first lottery was held for Selective Service on October 29, 1940. At that time the nation was still geared to a peace time defense program.

It is difficult now, in view of the drastic and rapid changes in our situation, to reconstruct our thoughts and reactions of even such a relatively short time ago. War seemed far removed. An easy-going America was

embarking on a long-range, comfortable program of building and stocking materials and equipment that might perhaps be necessary in the event that we were forced to defend ourselves against aggression. It must be recalled that our national program was basically one of defense preparation — if left alone long enough we would eventually be fairly well prepared to meet an emergency. Similarly, EDT was a comfortable program of defense training. Indeed, some voices were crying that no shortage of engineers was apparent or likely.

A year later the scene had shifted. The tempo had quickened and our program of training had expanded in step with the increased activity and consequent personnel demands of industry. As it accelerated, training expanded — training in chemistry, physics, and non-engineering production supervision as well as engineering was authorized in the enabling legislature for the fiscal year 1941-42. The Engineering Defense Training program was succeeded by the En-

gineering, Science and Management Defense Training program.

The change in scope and designation of our program came about as a result of experience gained in the first year's operations and the information concerning critical personnel needs gathered from organizations such as the American Society of Tool Engineers. At last some information regarding the types and numbers of technicians needed by industry and the armed forces had become available—we knew that real or impending shortages existed in chemistry, physics, engineering, and production supervision. While no one realized the magnitude that these shortages were soon to assume, few denied their existence as so many had the year before.

An early report of the American Society of Tool Engineers that came to our attention disclosed a need for over 78,000 Tool Engineers. The report indicated that in-service training could meet this need in part. It stated that some 30 per cent of the plants making tools and dies had some type of apprenticeship training under way, and that 41 per cent were training

men in one way or another to meet their peculiar requirements.

Despite this in-service training, the report showed that there were shortages of Tool Engineers in more than 25,000 metal working plants which employed together nearly 3,471,000 workers. These shortages were real and immediate—they existed then—they were not mere predictions. Consequently, little relief could be anticipated through long-time, in-service training programs. It was evident that short, practical, intensive training such as was available in ESMWT was needed. ESMWT then definitely entered the field with the following results:

Forty-nine colleges and universities offered 16 different courses relating to Tool Engineering with an enrollment of approximately 15,000 trainees. (See table). This training cost about \$5,000,000.

The courses were variously designated by such titles as "Tool Engineering," "Tool and Die Design," "Tool and Fixture Design," "Tool Engineering for Ordnance Production," "Aircraft Major Tool Design—Assembly Jig and Fixture," and "Tool Planning." Each of these was a "short and intensive" course, conforming to the intent and regulations of the ESMWT program. The typical course,

consisting of approximately 50 hours of lecture and laboratory, lasted on an average 12 to 16 weeks. Best testimony as to the success of these offerings is the number of requests from employers of certified trainees that the courses be repeated, some of them several times.

The American Society of Tool Engineers has helped the colleges and universities, many of which found Tool Engineering a somewhat unfamiliar field of training, in several ways. Its Emergency Defense Training Committee under the able and active chairmanship of President Otto Winter helped by reviewing literature and providing extensive bibliographic material on Tool Engineering. President Winter met with us and with representatives of ESMWT institutions to define course objectives and clarify course titles. As a result of this clarification, we were no longer confused as to the meaning of such titles as "die design."

The Society promoted the specific naming of courses so that qualified persons could be enrolled without confusion and trained in the shortest possible time for specific jobs. Thus, it was decided that the course "die design" should be called "Sheet Metal Die Design" if it was confined to training in, let us say, blanking dies to be used for sheet metal, and would not concern itself with drawing dies or forging dies. Since time was not

available to train men for all around designing it was recognized that we must abandon long-range concepts of education and train for specific jobs in which manpower shortages were pressing. This was in perfect agreement with the philosophy of ESMWT.

Engineering, Science & Management War Training is an emergency undertaking and will probably be discontinued when the present conflict is over. But the work we have done and the interest we have engendered in the subject of training Tool Engineers should be productive of valuable and continuing undertakings in this field by our engineering colleges along with those which will result in other fields.

Tool Engineers After War

Based on what ESMWT has done, it is to be hoped that institutions now giving training in Engineering and Physics and Chemistry and Production Management, will revise their curricula so that they will give courses that will train students for careers in fields that are now demanding technicians to do a war time job, so that this trained personnel will be equipped to meet the demands of our post-war conditions. Among these courses we confidently list the one in Tool Engineering. Something has already been undertaken along this line as witness the Educational Committee's "Proposed College Course in Tool Engineering."

At present, however, we must continue to find both men and women who have had enough schooling in mathematics and physics and drawing, or who have had the equivalent in practical experience, so that we can give them some intensive, short-time training to qualify them for immediate use. This is what ESMWT is intended for and is doing.

Tool Engineers can help us find just how many and what sort of "fractional Tool Engineers" are needed. They can make this information available to the schools, and can further aid them by helping to set up proper courses and, if necessary, supplying the schools with qualified instructors.

By this means you will be helping your own organization, you will be assisting us, and you will be making a worth-while contribution to our nation's all-out war effort.

THE END.

SCHOOLS OFFERING COURSES IN SOME PHASE OF TOOL ENGINEERING

NUMBERS INDICATE HOW MANY DIFFERENT COURSES ARE AVAILABLE

Alabama Polytechnic Institute	1	Washington University	2
University of Alabama	4	University of Nebraska	2
California Institute of Technology	1	Newark College of Engineering	1
Stanford University	2	Rutgers University	2
University of California	10	The City College City of New York	1
University of Southern California	1	Cornell University	3
University of Connecticut	2	Polytechnic Institute of Brooklyn	2
George Washington University	1	Pratt Institute	1
Yale University	1	Union College	2
Illinois Institute of Technology	3	Case School of Applied Science	1
University of Illinois	1	Fenn College	1
Purdue	1	Ohio State University	1
University of Notre Dame	1	University of Cincinnati	4
State University of Iowa	1	University of Toledo	3
University of Kansas	3	Carnegie Institute of Technology	1
Johns Hopkins University	1	Lafayette College	1
Massachusetts State College	1	Pennsylvania State College	3
Tufts College	1	University of Pennsylvania	1
Worcester Polytechnic Institute	1	University of Pittsburgh	1
Detroit Institute of Technology	1	Brown University	4
Lawrence Institute of Technology	2	A. & M. College of Texas	9
Michigan State College	4	University of Texas	1
University of Detroit	1	University of Virginia	1
Wayne University	1	Marquette University	1
University of Minnesota	1		

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Pearl Harbor widow drilling rivet holes in bomber belly gun door. Some engineers say she is not just doing a man's job, but is doing better than many men in plants.

O.W.I. Photo by Bransby

WOMEN in War Industry

ARNOLD THOMPSON

CHIEF TOOL ENGINEER
NATIONAL STEEL CAR CORPORATION, LTD.
AIRCRAFT DIVISION
MALTON, ONTARIO, CANADA

HAVE WE UTILIZED the potential possibilities of our women in war Effort? What are other nations doing?

In Nazi Germany, with a population of 79,000,000, about 15,000,000 women are engaged in essential war work, which is equal to about 1 in 5. Of the people engaged in the Royal Ordnance Factories of Great Britain 60 per cent are women, 32½ per cent semi-skilled men, and only 7½ per cent skilled men, and this dilution has not impaired efficiency. Up to date in Canada, with a population of 12,000,000 we have only absorbed 150,000 women — about 1 in 80.

Mrs. Rex Easton, Assistant director of National Selective Service of Canada in charge of Women Labour, is organizing to absorb into war factories all the women they require to release more and more men for active service in the front lines, this voluntarily and not by compulsion as in Germany.

What you are doing in the United States is best known to yourselves. Our

experiences and observations are offered with the hope that they may be of help.

A survey of war work in Canada shows that out of 623 operations required in war plants, 565 are performed by women. The women can and will do it. It is part of the Tool Engineer's job to expedite the use of women.

I WILL first express the opinion that sex does not present a vital problem. There are however, physical and philosophical angles that must be carefully considered in respect to employment of women in factories when doing work usually considered the prerogative of the male.

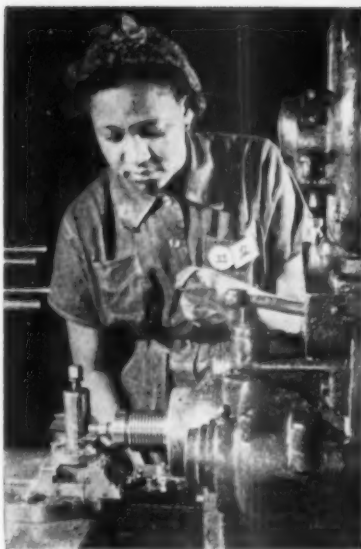
The chief factors affecting women at work are *personal welfare, transportation, housing, recreation, working hours and care of married women's children*. They must be recognized.

As has been stated by Mrs. Rex Easton, working in war industry means readjustment on the part of the

majority of women. There are mothers, previously accustomed to spending their days caring for their children, who now set out for work at 7 A. M. leaving the children to get their own meals, and find their own relaxation after school hours. There are mothers who leave pre-school age youngsters in charge of neighbors and even of neighbors' children. There are young girls who have never tried to exist without maids or mothers to do their washing and ironing, keep their rooms tidy and cook their meals. Many of these have found it extremely hard to locate suitable living quarters. Many have been downright lonely.

War working, means adjustment for all concerned. It is part of the sacrifice involved in fighting and winning a war. But it can and will be reduced as time goes on, and more employers are made to see the advantage of maintaining a high standard of working conditions in their plants.

To date, in all frankness, no employer has achieved perfection. One, for instance, whose case is typical, had a fine cafeteria, suitable washrooms, but no lockers. Until it was pointed out to him by a bright personnel manager, he failed to see this as a reason for so



Left — Young woman sizing bushings in a large eastern Navy yard aircraft plant.

O.W.I. Photo by Liberman

O.W.I. Photo by Palmer

Right—Mothers assembling war parts refute talk about women lacking mechanical ability.



many women workers throwing up their jobs. His grasp of feminine psychology didn't include a realization of the importance of providing a safe, clean place for women to put their street clothes.

A happy exception to the general state of affairs, is a plant employing more than 3,000 women, which combines excellent facilities with an understanding management policy. On this plant's premises are dormitories providing sleeping accommodation for approximately 1,100 of its female workers. There are 100 girls in each dormitory, two to each room. They pay seven dollar a week for room and board, and in addition to providing equipment in quarters for washing out "little things", the company foots the laundry bill for smocks and caps. This dormitory solves the problem of bringing girls from outside centers to the factory, that have not suitable lodging accommodation in the district.

Other desirable features in this same plant include a 13-bed hospital, 31 registered nurses, seven doctors, a store, a fire department, a police station, and beauty parlor with two operators, a bank, a post office and even a small newspaper. A community hall is the center of activity after working hours. There are good bowling alleys, ping pong tables, a reading room and library, badminton courts. A dramatic club is a winter feature. Movies are shown on certain nights and there is dancing every night, often to the music of an outstanding orchestra.

With such excellent provisions for every need, it is not surprising to learn

that absenteeism in this plant is practically unknown; or that the labor turnover is scarcely 15 per cent, and that more than half of those who leave come back, after finding that other fields are by no means as green. Some further investigation reveals that only 5 per cent of those living in company dormitories leave this plant, indicating that it is providing ideal working and living conditions for women.

Transportation, the second big factor in attracting and holding woman power to war plants, likewise provides headaches for many short-sighted employers. Others have found that by taking up their problem with the local streetcar or bus services they can help provide rapid, comfortable means of getting to and fro, eliminate the need for spending hours en route after a tiring day, or night, on a production line.

Any woman knows what a new hat, new fingernail polish, or a new hair-do contributes toward feeling right with the world, and women working in war plants are no different from the rest. If they have some time to themselves, a day or even a part of a day, to wash and set hair, manicure nails, press clothes, or get in a little extra sleep, their morale is much higher. And that necessitates giving consideration to the important matter of working hours.

Plants in which employees work ten hours a day seven days a week are finding the rate of absenteeism extremely high, because sooner or later Miss Jones or Miss Smith simply must have some time to herself, so she stays

home for a day, maybe longer. Such absences, particularly on the part of key workers, throw production away off balance, necessitate maintaining large squads of extra help. Plants which allow employees time off every week are finding it much easier to maintain planned schedules.

Naturally women have certain limitations. They average about one-half the average man's lifting strength, about two-thirds his pulling strength. They are most susceptible to skin disease and other disabilities contracted from being in the presence of certain chemical solutions used in the treating of rubber and metals.

Yet despite these handicaps, they are capable of doing more than 90 per cent of the jobs connected with manufacturing of any kind, and their weaknesses are more than offset by keen eyesight, flexible fingers, the ability to make careful adjustments at high speed, and to adapt themselves to more or less monotonous tasks, which call for alertness and patience.

FROM my experience and observations I have come to the conclusion that the training of women for war operations, by the ordinary methods of trade schools, is more detrimental than useful.

It is primarily a matter of selection, and then training in the factory for the operation required. It is difficult for a woman to unlearn what she has been taught. With a woman it is her job that is important, not the ultimate results of co-ordinated efforts.

We can classify women war workers into four general groups, as shown

on this page.

Then in each of these groups we have types, as short and tall, slim and robust, blondes and brunettes and other easily recognized distinctiveness and each type seem to fit better into some operation than others.

This is very noticeable in the recognized occupations of women particularly in entertainers, sports women, nurses and departmental store workers. "Birds of a feather, flock together".

By following some such guides you will be able to select the right type of woman for any of the 500 or more different jobs that women must do for war needs.

A careful selection of the right type will simplify the training problem. A specific operation or types of operations is only a matter of a few hours training, and can usually be given by the set-up man, charge hand, or foreman, or any one that understands women workers. For the guidance of those who have to select, train and use women workers, the following may be helpful.

There is a basic fundamental principle differentiating men and women in respect to their mental outlook. It is accepted by most students of philosophy that a woman is largely governed by her will, and a man by his understanding. A man wants to argue the point, a woman's reason is "Just because". The male is the usual provider for the future and he must plan progress.

The female usually is content to do the every-day duties, each and every day with no desire of understanding why and wherefore. You show them what to do, how to do it and when to do it. They like to do things with a rhythm and naturally are fast workers. They excel in jobs like knitting, sewing and typing, are more concerned with this week's pay than future prosperity and are not prone to investigate, or to do otherwise than instructed.

I would not like to leave the impression that this difference is true of all women, it is more the results of the home training and the past attitude of men towards their own women folk that has developed this trait in women.

Since women are coming more into industrialism and are training for equal jobs with men, the philosophical

difference between men and women is being more balanced and you will find women who naturally adapt themselves to those jobs and professions so often thought the prerogative of the male.

The call is going out for more and more women, preferably young, strong, single and untrained. War industry appeals to them and with very little training and little supervision, they work most efficiently. I can state many instances where they have done far better than skilled men.

During the last War on a battery of 24-3¼ single spindle Gudley Automatic Machines cammed to all high speed a 52-second cycle, one girl fed two machines by hand as efficiently as an automatic magazine feed. A time study job on Number 4 Warner & Swasey turret lathes of men operators

GENERAL CLASSIFICATION

- Those women who have always worked or come of a working family. Working in department stores, waitresses, office workers and factory workers, they easily adapt themselves to war factory requirements.
- Girls 16 to 20 studying in high schools, universities and business colleges make the best class of war workers. They are easily trained to any job, as it is only a continuation of their studies.
- Girls 20 to 24 who never have had to do any type of work, of fairly prosperous families and who usually excel at sports make excellent war workers.
- Women who have never worked and have children and dependents and must work to support them. This type requires especial treatment to obtain the best results. They must be relieved from all home worries before they can do efficient work.

O.W.I. Photo by Bransby



was 45 seconds. This was done by women in 32 seconds.

Again in this war, girls on selective assembly or fuses made a minimum of 22 motions with three parts in 9 seconds using dial indicators and assembly to a clearance of .002 (the best I could do was 15 seconds).

WOMEN respond better to male than female supervision, but it is desirable that there be a woman counselor in every factory, particularly to introduce new employees, and explain all rules and regulations. During the last war we had to train women workers in matters of suitable dress, hair protection, skin protection, necessity of first aid for minor cuts. Footwear was a problem, but now most women look after these things themselves although a few may have to be guided.

Use lecture halls for general instructions about the operations performed. Uptrain women to set their own machine, grind their own tools, read blue prints, make drawings, do tool making, jig and tool design — and eventually why not women Tool Engineers. Treat your women like comrades, not as playthings. Women do not wish to be "courted" by men while at work, the men are usually the offenders. So take steps to have the right type of men working with women. A woman wants one job, a man a dozen.

A common saying is "Women have no mechanical ability". It is more accurate to say that they have little "mechanical familiarity". Get them familiar with mechanics and their progress is amazing. They do not waste time like the boy apprentice but concentrate on their job, and are most happy in doing it. Another vital factor is women should have equal pay as men doing similar work.

Women have a beneficial effect on men supervisors and foremen. The ego of the male wants perfection in his woman and they inspire him to use his skill and ingenuity to improve their work. It is not necessary for me to advise Tool Engineers how to design their equipment to suit women operators. The requirements are similar as for men, but the idiosyncrasies of women as above outlined are sufficient for all good tool designers to act on.

THE END.

Training the Available LABOR SUPPLY

T. O. ARMSTRONG

INDUSTRIAL RELATIONS MANAGER
WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
SPRINGFIELD, MASSACHUSETTS

INDUSTRIAL MANPOWER and material scarcity constitute the two major problems of the nation in our present emergency. I am not sure which is the more important; both go hand in hand with our problem of production; and each play an exceedingly important part in the job of the Tool Engineer and the personnel man.

Manpower problems have been given considerable publicity over the past several months. Most of the statistical facts are well known. On the other hand, it is well to consider for the moment, the general problem.

1. The armed forces are now competing for the best manpower that is available. Not only are they searching for the best physical manpower, but they are desiring technical and mechanical manpower.

2. Manpower available to industry is made up of the over-age, the very young, those who have done other work—now considered non-essential, five million women, and hundreds of thousands forced to change their way of life and to learn new and different skills.

When we consider the modern fighting machine and recognize that it takes twice the number of cargo ships to carry the gear and equipment with every single troopship than was required in World War I, we begin to appreciate the extent of skills in manpower needed to keep the equipment of a modern fighting machine in full use and maintained.

General Somervell said recently: "Our Army is an Army of specialists. Out of every one hundred men inducted into the service, sixty-three are assigned to duties requiring specialized training."

For example: about the shortage

of radio operators he said: "Out of every three hundred thousand men inducted, we need four thousand, six hundred and eighty-nine radio operators. We are getting one hundred and thirty-five." About the shortage of mechanics he said: "We need one thousand, five hundred and sixty-two master mechanics out of every three hundred thousand men inducted. We are getting fourteen, a shortage of one thousand, five hundred and forty-eight."

This is the challenge to the people who have the responsibility for education; those responsible for pre-employment education in our schools, those responsible for induction after they enter industry, and you who have the technical skills throughout industry.

The Tool Engineer's task is one of searching out new, better, and quicker ways of doing things; simplifying jobs, making it possible to use the available labor supply. Out of the last war came the milling hand, the shaper hand, the lathe hand and the production welder. There is also a challenge for a greater elimination of materials that are so critical, materials of which there is just not enough to go around.

These things you have done in the past; they represent the ingenuity of the Tool Engineer that has brought about a production system that is the greatest in the world.

GIVEN the problem, let us now turn our thoughts to the other two phases: (1) pre-employment work in our schools, and (2) induction after they enter industry.

If we recognize the chief objective and purpose of the pre-employment instruction in our trade school system as one of preparing our citizenry for production, making the beginner acquainted with the tools, machines and materials employed in the industry

where he or she will work, we can appreciate the task of the trade schools during the past few years.

What they have done, what they can do, and the problems they are meeting might best be illustrated by giving you the experiences of our own Springfield Trade School. (See also *THE TOOL ENGINEER*, Oct. 1942).

In July, 1940, a year and a half BPH (before Pearl Harbor) a group of 120 were carefully selected out of 700 applicants to be introduced into the intricacies of machine shop practice. They completed the course in August and all were placed in the metal working industries of Springfield.

In September the school in addition to its regular daytime courses operated all their Defense Courses from 11 pm to 7 am, operating a 24 hour schedule, and adding 12 more courses.

Trainees were recruits from among the unemployed, and, for many of these the courses were merely a "refresher" in some skills previously acquired and later lost in idleness. Later on trainees were recruited from among the men who were engaged in non-essential and non-war occupations.

Over a period of 26 months 4,476 different persons were enrolled in our Defense Training Classes. Of this total 1,449 were women, young and old, married and single. All were placed at the completion of their courses in war production plants. Trainees have been added to 54 occupational groups in the Springfield plants that are being serviced by the school.

I can assure you that the "all out" drive to produce production workers has attained very satisfactory results, not only in terms of building a reservoir of workers, but in personal satisfaction experienced by trainees.

AT the same time that new hands were being brought into industry through the so-called "refresher courses", many of those already em-

played were being advanced or upgraded to positions requiring greater skill. To meet the demand for training, the schools instituted the supplementary course program.

Because of military secrecy in such matters I cannot tell you about the training services our school has offered for the Ordnance Department, and the Air Corps, and in training hundreds of soldier mechanics in the use of common machine tools, so that they may subsequently be attached to the mobile units of the armed forces throughout the country. Our school is also training men and women in radio maintenance and repair, and the assembly and dis-assembly of aeronautical motors.

The peak in this pre-employment program apparently has been reached, for there is an acute shortage at the moment of trainees. For example: during the month of September, the enrollment fell off approximately forty per cent, and while constant appeals are being made over the radio and in newspapers for more candidates, they are finding their way into industry and by-passing the school. This condition exists, no doubt, for the following reasons:

1. *Acceleration of the hiring program by industry.*
2. *Lack of ability to plan on the part of industry.*

In other words, as production schedules increase, industry is not able to wait for the pre-employment process to get their workers, resulting in idle school training equipment and services. In the second instance, industry is hesitant to commit itself to a pre-employment program, not being able to assure itself that it can take on the trainees when available, due in most part to the material situation.

These factors indicate that further use of the pre-employment services of the school will be dependent upon what happens with the manpower program of releasing more workers from non-essential occupations, bringing them into the labor market, and bringing about a supply of trainees that can be immediately absorbed.

RECOGNIZING these problems, the process of induction of labor into industry becomes an important factor of production. When the new worker enters the plant and is placed

on the job, further and final training has to be given. Even if the new worker has had a pre-employment course he will need training on the particular job he is to do.

The War Manpower Commission estimates that at least 95 per cent of all training within industry must be done right on the job. The fellow who must do this training is the fellow who has been on the job, and has the "Know How". He must develop skill and ability in passing this "Know How" along to the new worker.

We have realized, at this stage in the game, that to leave the new man to pick up the job as best he can as he goes along wastes materials, tools, and time, and yet that is just the way that most of our "old timers" acquired their skill. It is only natural for them, in many cases, to have the feeling, "I came up the hard way. Let the new fellow learn the same way I did." This attitude is fast disappearing as the urgency for war production is brought home to our people. But behind this attitude, we have found there often lies the lack of a method or system that will make it *easy* for the skilled man to pass his "Know How" on to the new worker.

You who have worked with methods, use them to do your job effectively and more easily. You can appreciate the need for a method to make the job of "breaking in" green help easier and

more effective. I am sure you have all heard people say, "I haven't time to spend giving instructions to new men", but there is no denying the fact that new men have to be instructed, and it is someone's responsibility to give that instruction.

SEEING the need for a method of teaching a job, the Training Within Industry Division of the War Manpower Commission developed a short ten-hour course based on the experience during and since the last war. This course of training, called "Job Instructor Training" has taken hold in industry throughout the country. Its widespread use testifies to the need which existed and which it fills.

The program has now reached over 4,000 war production contractors and has thus affected units employing over 5,000,000 persons. There are available over 3,500 trainers who go from plant to plant putting on this program, and over 175,000 job instructors have been certified in the war production plants of the country.

As you men well know, it is not always the foreman who does the training; it is usually the man to whom the foreman sends the new worker for the "breaking in" process. This person may be a lathe hand, assembler or die-maker, file girl, draftsman, or clerk. From every occupation in the factory or office, experienced workers are

The Under Secretary of War, Robert P. Patterson, shown here firing a light machine gun at Fort Leonard, has stated, "Every mine, every mill, every smelter, every chemical plant, every forest is a fighting front on which we must beat the enemy." Training the available labor supply to furnish the soldier with his gun is as important as training the soldier to use the gun when he gets it.



brought into the ten-hour course to learn an easy, standard, efficient method for passing on what they know to the new employee.

During the first two hours of the course certain principles and methods of good instruction are discussed and analyzed. The four steps in instruction are learned by the group members. They are:

STEP 1. Prepare the worker. Going into the various phases of this step, the "how" of preparing the worker is learned, i. e., putting the learner at ease, finding out what he already knows about the job, getting him interested in wanting to learn the job, and placing him in the correct position to learn the job.

STEP 2. Present the operation. This is the phase of telling, showing and illustrating, and stressing the various key points, such as, particular knacks, and feels.

STEP 3. Try out performance. This is where the learner gains his first experience in performing the job with the instructor, for guidance and correction.

STEP 4. Follow up. This is the phase where the new worker is placed "on his own".

The remaining eight hours are devoted to practice demonstrations with sub-assemblies, and other things they actually use on their jobs.

A particular phase of this program, and one which should be of prime interest to the Tool Engineer is the

method of "How To Get Ready To Instruct". Emphasis is placed upon the need for having a time table so that the instructor knows how much skill he expects the learner to have, and how soon. It provides a "job breakdown sheet" for listing the principal operations and key points in the job, and further points to having the necessary tools and equipment ready, with the workplace arranged as he expects the learner to keep it.

The keynote of the program is: "If The Worker Hasn't Learned, The Instructor Hasn't Taught".

HOW effective this type of training has been is best illustrated by the comments of workers in my own organization who have gone through the experience. Their remarks point to many benefits of the program which have not been stressed thus far, and point to other factors of industrial relations which affect production.

A survey of over a hundred workers who have recently completed this training and have used this method in breaking in approximately a thousand other workers brought out the following comment:

"The new people I trained learned more quickly."

"The people I trained were more confident in themselves."

"They grasp ideas quicker."

"They have more confidence in themselves and in me."

"They have mentioned that the job was all made to seem so easy when they had expected it to be very hard to learn."

"More than 50 percent of my people are new, and soon will have to train others coming in. I want all of them to take this training."

Ninety-five percent stated that the program had increased their production, had reduced scrap during the training process, and had made their jobs easier.

Another interesting fact uncovered by the survey was that most people considered the first step, that of "Preparing the Worker", the most important of all the steps, which indicates that these workers felt that more important even than developing skill in showing the job and having the man perform the job, is to develop a skill in overcoming his initial fears, anxiety, nervousness and in getting him interested in and anxious to learn his new job.

"ON-THE-JOB" training will of necessity continue to play an increasingly prominent role in industry, right up to the end of the war. For not only is the available supply of labor diminishing; it is changing. Where you "broke in" a strong quick boy on a job yesterday, you will have to "break in" an older, slower man tomorrow. Where you trained a man on a job yesterday, you will have to train a woman tomorrow. Unless your plant is already at its peak and is manned 100 per cent by women and men over 45 years of age, your "on-the-job" training problem will continue right through the war period.

Training the available manpower resolves itself into a problem to be met by both our schools and our industries through cooperation. There remains, however, the problem of coordination between school training, industrial needs for manpower, manpower needs of the armed services, and shifting of manpower from non-essential to essential industries. A centralized, coordinating agency in the community is needed. The United States Employment Service of the War Manpower Commission may be the answer. If it is, the time has come for closer collaboration between the U. S. E. S., the schools and industry.

THE END.

Members of a merchant crew, trained by the Navy's Armed Guard Mobile Units, assist a Navy gunner to operate a 20-mm. gun aboard ship. Gun crews usually consist of three or four men. About 95 percent of the labor which will be needed to supply guns, ammunition and armor must be trained in the supplier's plant.

Official U.S. Navy Photo



FIGURE 1. Some of the tools used by Pratt & Whitney Aircraft, which constantly studies how to get more life, better performance.

Pratt & Whitney Aircraft Photos



ARTHUR A. MERRY

PRODUCTION ENGINEER
PRATT & WHITNEY AIRCRAFT
EAST HARTFORD, CONNECTICUT

TOOL CONSERVATION

FOR the past two years we have constantly brought to the attention of what started out to be OPM and later became WPB, the critical cutting tool situation. In our particular industry we could definitely see that the millions of dollars that was being spent for machine tools could easily be of no avail without cutting tools.

There were some pretty harsh things said during our conferences but as a result some expansion was authorized. Unfortunately Washington could not anticipate all of the expansion that would be necessary nor the requirements of tungsten, molybdenum and other alloys for tool steels. We were forced to make the greatest use of materials we had.

The first thing we did was to go through our tool cribs and stock rooms and dig out every tool that in a 15 year period had become obsolete. These tools we were able to convert into useable tools. There are many times we would have had to shut down our production lines if we had not been able to salvage from obsolete stock the tools that we just could not

get from manufacturers.

We feel that in every plant this cutting tool situation will become worse rather than better. Unfortunately, high speed steel suppliers and the shops that fabricate tools have never been expanded as fast as the plants using tools. Consequently these plants must assume some of the responsibility and work out their own tool problems.

Saving High Speed Steel

Who would have believed, looking back to 1929, that we would ever see the day that we would use cemented carbides, selling at that time for \$453 per pound, to save high speed steel. I shudder when stopping to think what we might be up against today had it not been for cemented carbides. Certainly the shortage of rubber would have to take a back seat, for conservatively, the over-all ratio of productivity for carbides over high speed steel is 10-1. The thing for us to do is to take the fullest advantage of them that we possibly can, for you not only can use the material itself to supplement your high speed steel

shortages but you can use the experience of the carbide companies in helping you to use your high speed steel more effectively.

There is scarcely a thing that has been taught about using cemented carbides that cannot be applied to high speed steels to the extent that your performance will increase tremendously.

Considering the effectiveness of the tungsten used in carbide tips as compared to the tungsten used to make high speed steel, we must use carbides if the job is even half way suited for them. It will make it possible to save high speed steel for jobs that carbides cannot do.

There is further a need for educating machine operators in the whys and wherefores of saving cutting tools. Show them the vital necessity for treating tools and machines with care. Their very lives depend upon it.

Though plants as large as ours have many opportunities that smaller plants might not have, the following photos show many of our tool conservation developments which small plants can use to good advantage.

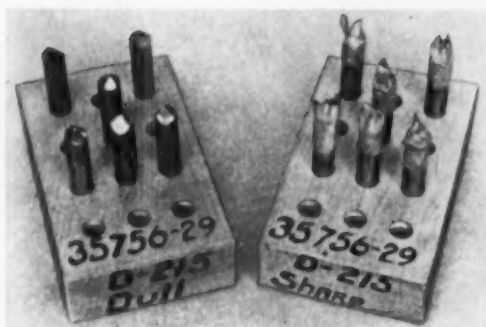


FIGURE 2. These blocks make it more profitable to grind a number of tools simultaneously, eliminate setting up a grinder when a sharp tool is needed. Pratt & Whitney uses them for Heald and Ex-Cell-O Boring and Turning machine tools.

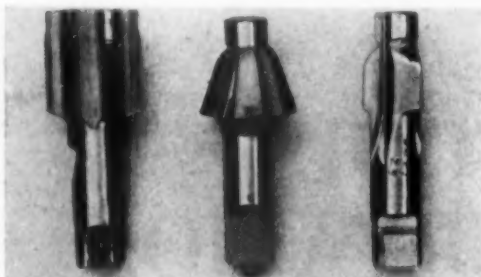


FIGURE 3. Worn out taps are salvaged into piloted counterbores. Here are counterbores made from one type of tap.

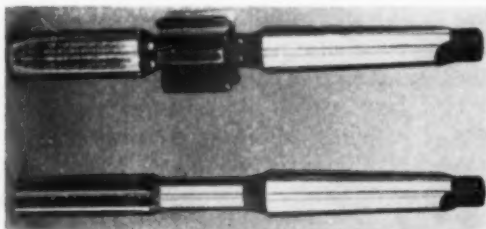


FIGURE 4. Some tools can be re-hardened. A worn out profiling cutter shown here has been reworked into a reamer.

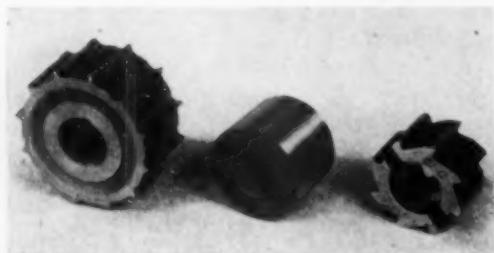
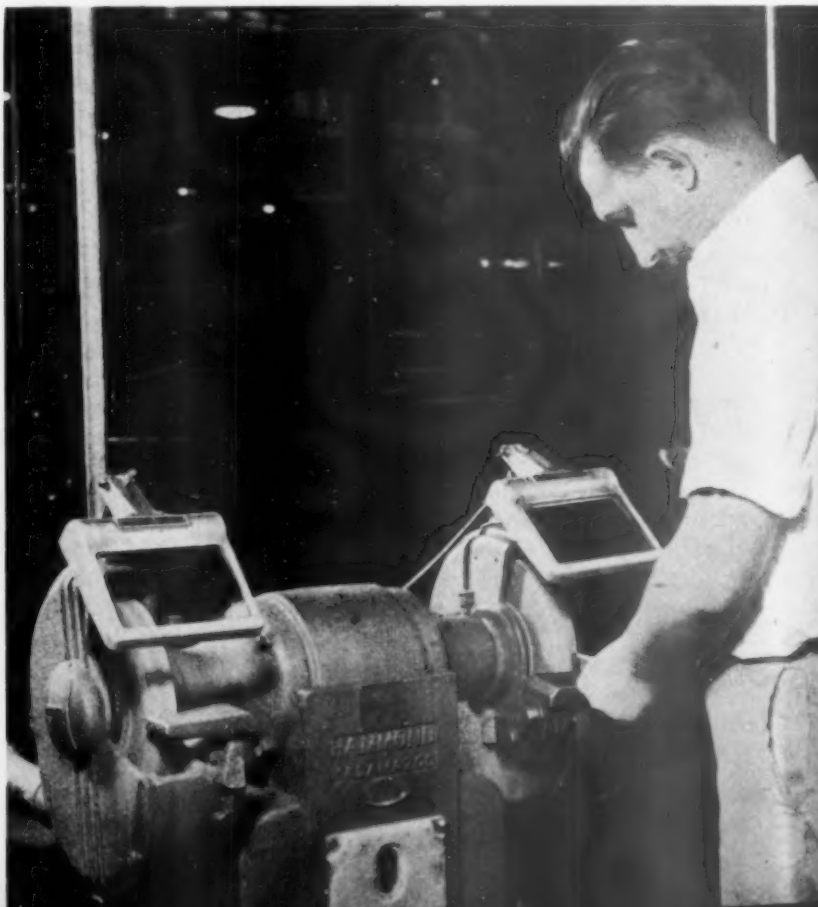


FIGURE 5. Making good use of steel — from hob to shell end mill. Most of the work is done by men and women learning to be cutter grinders.



FIGURE 6. To give some idea of grinding machine advancement, here is one costing more than \$5,000. It insures constant clearance all around a form, is invaluable when it can be used in making tools produce more pieces per sharpening, because the angles are correct all around radius, forming cutting edge.

FIGURE 7. This type of machine is used only to rough out a tool. The final edge and angles should be put on with firm wheels and proper rests. Use the practice as taught by the carbide companies by using secondary angles. This type of grinding is used too much for finish grinding resulting in a variety of edges, shapes and waste of time and material. Operators should learn the importance of having one best way to sharpen a tool. The answer lies in having as many tools as possible ground to approved prints in one grinding room, then inspected like machine parts.



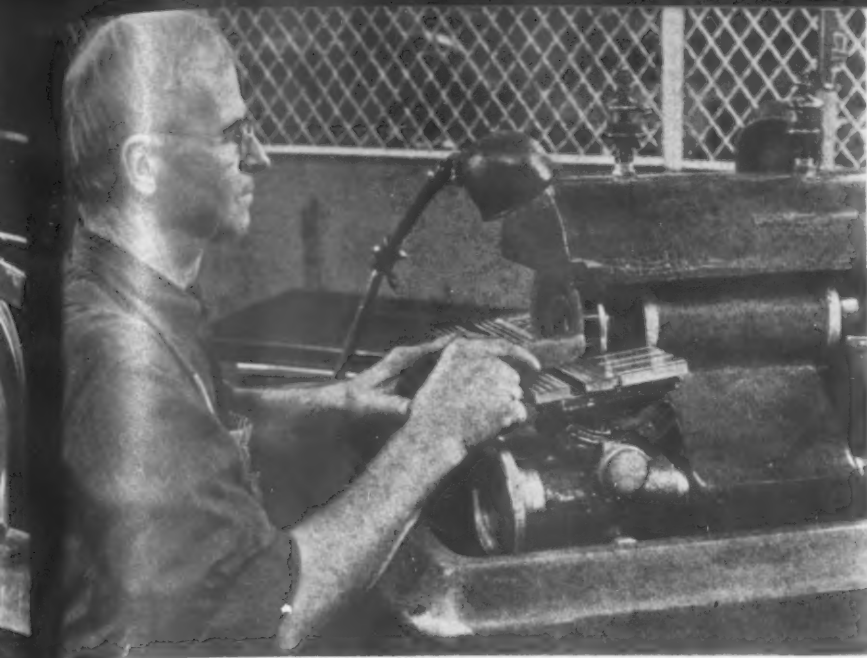


FIGURE 8. Here is a proper rest. This is a diamond wheel on a carbide tool grinder. The same grinder can be used by changing wheels for high speed tools when it is important that angles be maintained accurately and cutting edges dead smooth. Rough grind on a heavy duty grinder with a coarse medium hard wheel, keeping the angles 1° to 2° more than desired. When these tools are finish ground, the correct angle is applied with a finer wheel. When the same care is given to grinding high speed tools as is given carbides, your results will increase proportionately.

FIGURE 9. This is how Pratt & Whitney uses up odds and ends of high speed steel. Some are butt welded, others are tipped, using left over shanks from carbide tools. Low melting Easy Flow is used, following the same general practice as used in carbides for brazing. The two tools without tips are made in this manner.

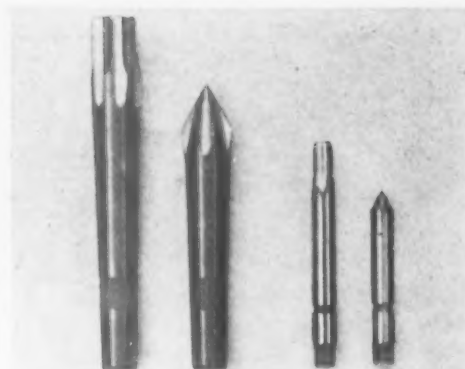
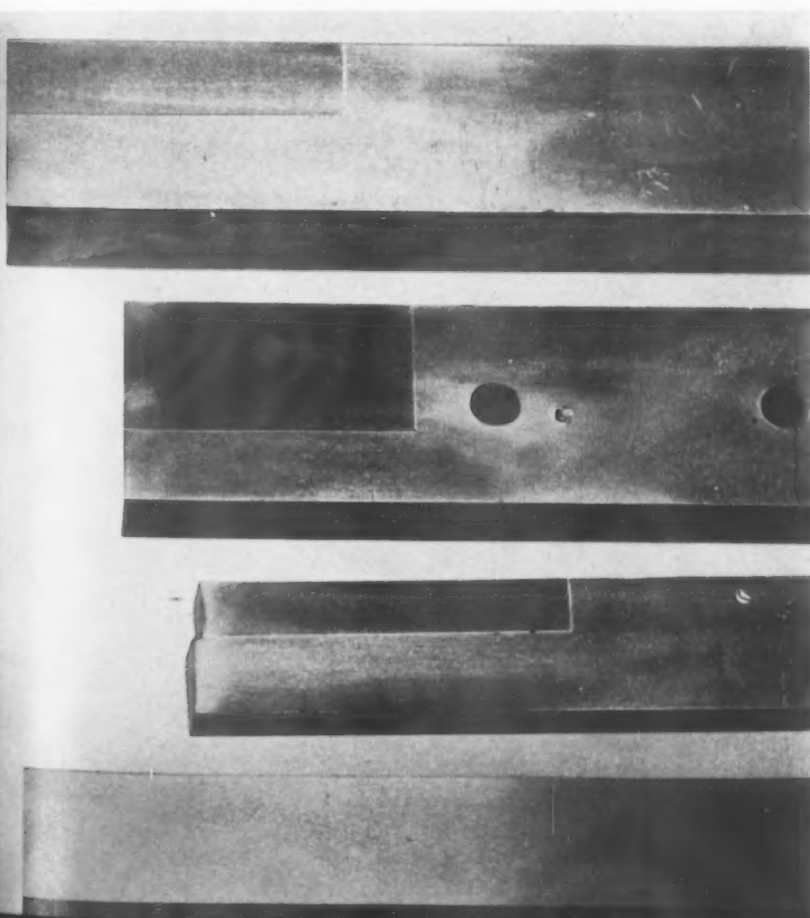


FIGURE 10. From worn out taps to centers. On the way down they could have served a "hitch" as a reamer, probably did.

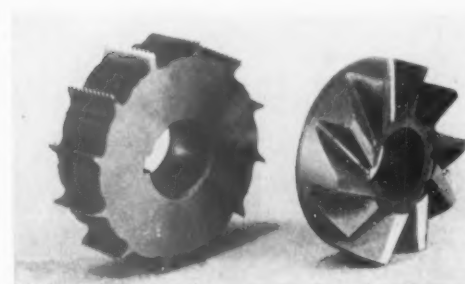


FIGURE 11. This could be made into a spot facing cutter. Since there is more abrasive material than high speed steel, cutter grinders must be trained.

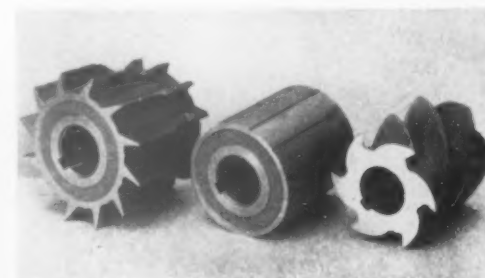


FIGURE 12. Soft coarse wheels will reduce your scrap pile. It is cheaper to use up wheels than burn up good steel. Too, often grinding wheels are too hard.

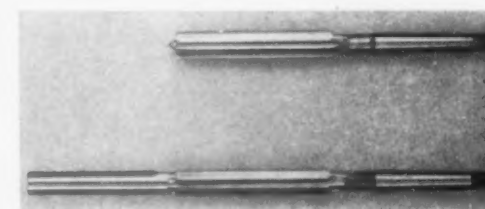


FIGURE 13. Some wonder how to center hardened pieces. Pratt & Whitney doesn't. It puts on a male center. Size with pilot .598. Converted into standard .5835.

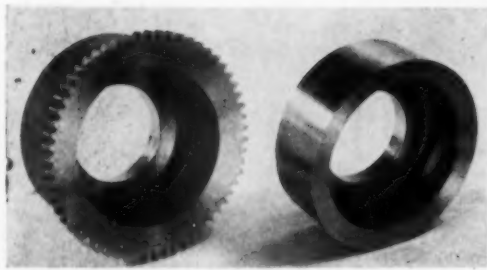
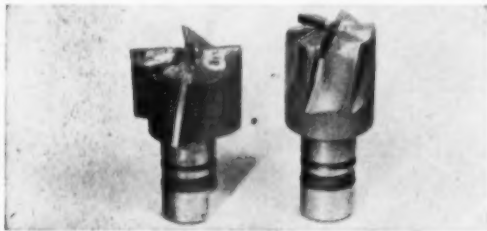


FIGURE 14. A gear tooth cutter becomes a shaping cutter after the life is gone from teeth. Make a special setup for finishing faces of Fellows cutters and it will pay dividends. Use fine, soft wheels.



FIGURES 15, 16, 17. Three high speed tools that have become worn undersize, with brazed carbide tips, bringing the size back to normal. Method is also used on broaches.

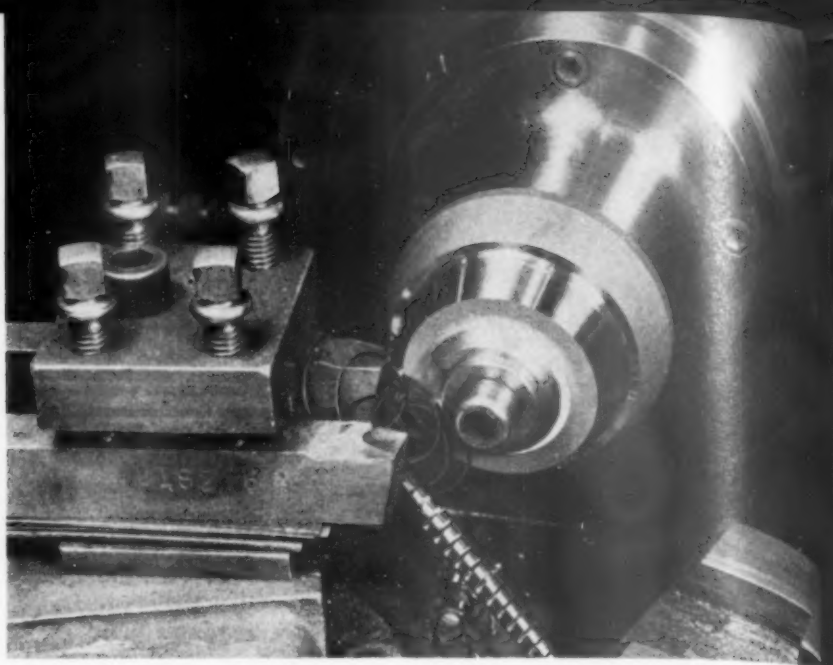
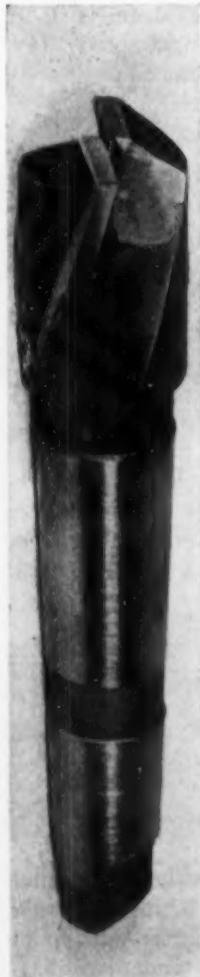


FIGURE 18. Pratt & Whitney wouldn't know what to do without carbides to use on hard steels in machines. Here is a roughing and finishing tool working together on a bevel pinion.

FIGURE 19. This is a rack in a departmental crib showing tools ready to go to Salvage Department. Every piece of steel is used somewhere before it is beyond doing some kind of a cutting job. Notice the boxes of reamers and drills under the racks. These will be put to some good use.



PRODUCTION DATA SHEET

TABLE OF WHEEL RECOMMENDATIONS CENTERLESS GRINDING

The following table shows a few typical wheel selections for a variety of centerless grinding operations. Part of an article by H. J. Wills, of the Carborundum Company, half of which appears in this issue of *The Tool Engineer*, it was selected as the type of vital material which has made these Production Data Sheets useful to war production engineers.

Though it will not always show the best wheel, even for jobs identical to those listed, because of shop conditions and peculiarities of

operators, it may be termed a good middle of the road guide. With an understanding of the underlying fundamentals of grinding action (see *The Tool Engineer*, September, 1942, and Mr. Wills' article in this issue), the engineer can use this chart to select wheels including the best one. By test, he can quickly choose the best wheel for the job.

Another table of recommendations for internal grinding will appear in the December *Tool Engineer*.

PART, MATERIAL & OPERATION	ABRASIVE	GRAIN SIZE	GRADE	BOND
AXLES, AUTOMOBILE	ALUMINUM OXIDE	40 COMBINATION	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
BALL RACES, RADIAL	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
BARS	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
	SPECIAL SILICON CARBIDE	50	HARD	"
	" "	50	MEDIUM	"
	" "	60	SOFT	"
BRASS	SILICON CARBIDE	60	MEDIUM	RUBBER
	" "	36 COMBINATION	HARD	VITRIFIED
	" "	50	MEDIUM	"
BRONZE, HARD	" "	50	SOFT	"
	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
BUSHINGS, HARDENED STEEL, ROUGHING	" "	60	SOFT	"
	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	60	SOFT	"
	" "	80	HARD	"
	" "	80	MEDIUM	"
FINISHING	" "	100	SOFT	"
	SILICON CARBIDE	36 COMBINATION	HARD	VITRIFIED
	" "	36	MEDIUM	"
BUSHINGS, CAST IRON	ALUMINUM OXIDE	60	HARD	"
	" "	60	MEDIUM	"
	" "	80	SOFT	"
CAM ROLLERS	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	36 COMBINATION	MEDIUM	"
	" "	36	SOFT	"
CAST IRON	ALUMINUM OXIDE	30	HARD	VITRIFIED
	" "	40	MEDIUM	"
	" "	40	SOFT	"
HOUSINGS, AUTOMOBILE AXLE	" "	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	60	SOFT	"
PIPE BALLS, MANGANESE, ROUGHING	ALUMINUM OXIDE	30	HARD	VITRIFIED
	" "	40	MEDIUM	"
	" "	40	SOFT	"
	" "	60	HARD	"
	" "	60	MEDIUM	"
REGRINDING	" "	60	SOFT	"
	" "	60	MEDIUM	"
	" "	60	SOFT	"

PRODUCTION DATA SHEET

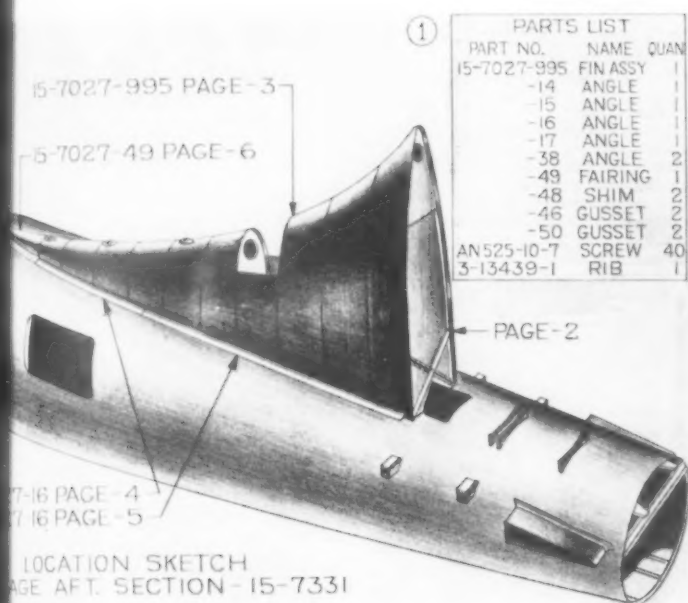
PART, MATERIAL & OPERATION	ABRASIVE	GRAIN SIZE	GRADE	BOND
PISTONS, ALUMINUM, PLAIN CENTERLESS	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	40	MEDIUM	"
	SPECIAL " "	60	SOFT	"
ELLIPTICAL CENTERLESS	" "	60	MEDIUM	"
PISTONS, CAST IRON	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	40	MEDIUM	"
PISTON PINS, ROUGHING	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	60	SOFT	"
SEMI-FINISHING	" "	80	MEDIUM	"
	" "	100	SOFT	"
FINISHING	ALUMINUM OXIDE	150	HARD	RESINOID
	" "	150	MEDIUM	"
	" "	220	SOFT	"
ROLLER BEARING CUPS	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
ROLLERS FOR BEARINGS	ALUMINUM OXIDE	60	S., M., or H.	VITRIFIED
STEEL, HARDENED	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	80	MEDIUM	"
	" "	80	SOFT	"
STEEL, SOFT	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60 or 80	MEDIUM	"
	" "	80	SOFT	"
STEEL, HIGH SPEED	SILICON CARBIDE	36 COMBINATION	HARD	VITRIFIED
	" "	50	MEDIUM	"
	" "	60	SOFT	"
	ALUMINUM OXIDE	60	HARD	"
	" "	60	MEDIUM	"
	" "	80	SOFT	"
STEEL, STAINLESS	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
	SILICON CARBIDE	36 COMBINATION	HARD	"
	" "	50	MEDIUM	"
	" "	60	SOFT	"
	" "	60	MEDIUM	RUBBER
TUBES, STEEL	SPECIAL SILICON CARBIDE	40	MEDIUM	VITRIFIED
	" "	60	MEDIUM	RUBBER
VALVES, AUTOMOBILE	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"
	SPECIAL SILICON CARBIDE	36	HARD	"
	" "	50	MEDIUM	"
	" "	60	SOFT	"
VALVE TAPPETS	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	80	SOFT	"

Under many operations three wheel selections are shown, one each for combinations of coarse grain with hard grade, medium grain with medium grade, and fine grain with soft grade.

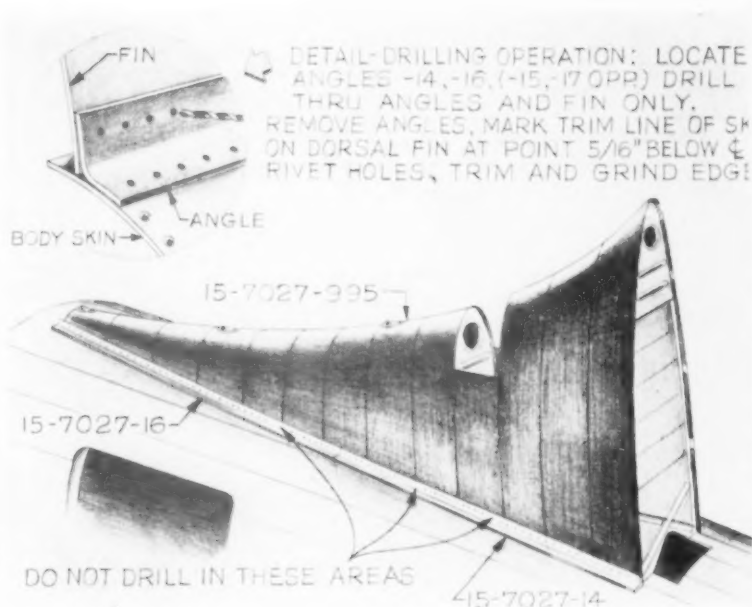
NOTE: On this and the preceding page is the thirteenth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

Men, Materials and Machines

SHORTCUT TO PRODUCTION: Three -- Dimensional Drawings



PARTS LIST		
PART NO.	NAME	QUAN
15-7027-995	FIN ASSY	1
-14	ANGLE	1
-15	ANGLE	1
-16	ANGLE	1
-17	ANGLE	1
-38	ANGLE	2
-49	FAIRING	1
-48	SHIM	2
-46	GUSSET	2
-50	GUSSET	2
AN525-10-7	SCREW	40
3-13439-1	RIB	1



Boeing Aircraft Company Drawings

Above is the drawing on the cover page of a Boeing Production Illustration Shop Book. The sketch is for location of the job to the finished section of the aircraft. About 40 man hours are required for developing and completing a typical illustration at Boeing, including research, planning, drawing,

checking, printing and binding in book form. At right above is another of this manufacturer's production illustrations from the same book. It shows the worker the proper procedure for fitting the angles for drilling on the installation of the dorsal fin of the Flying Fortress.

C. W. EASTON

TOOL ENGINEER
BOEING AIRCRAFT COMPANY

CONTINUAL BUGBEAR to mass production engineers is striving to make blueprints understandable to thousands of new employees with little or no industrial experience. Standard plan of shop procedure on the production of any part fashioned of metal or wood or plastic or glass, the blueprint is little more than a myriad of crisscrossing and conflicting lines to the "green" production worker from the farm, the soda fountain or the department store office.

Overtaxed training facilities cannot begin to teach blueprint reading to hundreds of thousands while vital war

production waits for experienced workers.

Bright spot in the mass-production problem is a timesaving device generally described as "Production Illustration".

The creation of a new trade known as Artist-Engineering, production-illustrations are three-dimensional drawings that show at a glance exactly how innumerable component parts of a given structure should be assembled. It is so simple in principle and operation that the layman's reaction

inevitably is, "Why, hasn't everybody always done it that way?"

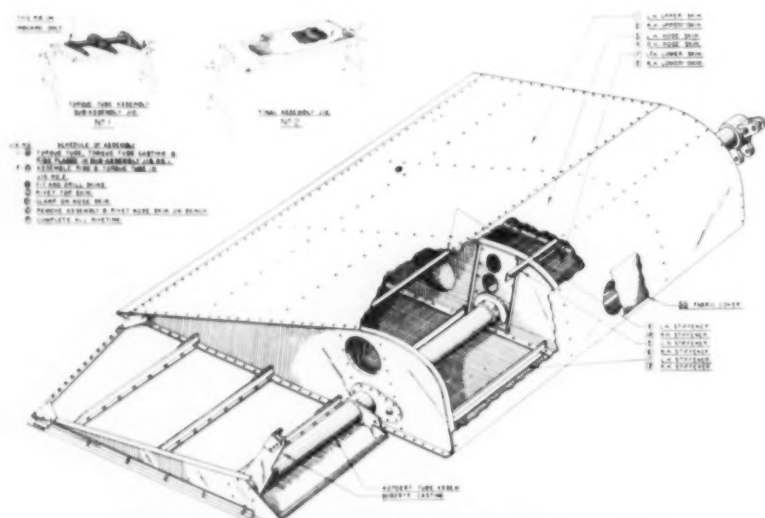
Not only is the answer "no", but the vast majority of Tool Engineers must admit that the plans for relatively little of mass production in the war effort have been facilitated by this remarkable development. To date it has achieved its greatest acceptance in the aircraft industry. Key to workable usefulness of three-dimensional drawings of this type lies in the fact that at the Boeing Aircraft Company, for example, they are classified as "Tools." They are ordered on a regular tool order form, and produced by

PRODUCTION ILLUSTRATIONS ELIMINATE BLUEPRINTS IN DOUGLAS FINAL ASSEMBLY

CREDITED with origination of the general idea upon which various types of production illustrations are based is George Tharratt, a Scotsman who used such diagrams as a Royal Air Force Technical officer during the first World War.

Tharratt introduced his idea at Douglas Aircraft in 1937, and two years later a department was set up there which subsequently expanded from four to 40 men. Having been adopted almost universally by aircraft manufacturers, the WPB's Training Within Industry Division has been suggesting the use of production illustrations to other industries engaged in war production.

A PRIME OBSTACLE to the rapid development of production illustration has been lack of engineers who can draw, or artists versed in engineering. The combination was so difficult to find that Tharratt, with the cooperation of Edward A. Adams, of the Los Angeles Art



A typical production illustration drawing from the Douglas shops showing a light bomber inboard wing flap assembly.

Center School, set up a training course now two years in operation. From its class rooms a steady stream of production illustration artists are now pouring into war industries.

Production illustrations have no regard for specific accuracy, carry no dimensions and in no way replace the blueprint which is essential to close tolerance manufacture of individually machined parts. These drawings, an average of 500 of which are made for most Douglas airplane designs, are used only by assembly workers. Many timed tests have proved that highly skilled shop men can learn and complete an assembly job up to 60 per cent faster when working from production illustrations than when using standard blueprints.

At Douglas, these drawings have completely eliminated blueprints on all final assembly lines, according to observers who have studied the process in operation there.

the Production Illustration Unit, a division of Boeing Tooling Department.

The exploded type of drawing shows inexperienced workers how the job goes together, but it remains the duty of the foreman to instruct each worker on the phase of the operation which comes first, and to provide further instructions with each succeeding step.

Boeing's production illustrations bring out the correct sequence of operations; what parts are needed, lists them by number; and shows where such parts are located. The illustrations also list the tools required for the job and where such tools may be obtained. These illustrations are tailor-made for the job, eliminate many questions from the workers, and greatly relieves the instruction job which has fallen upon the aircraft supervision.

Greenhorns Comprehend

In one week alone twelve inexperienced workers were broken in on their jobs with Boeing's new type of production illustration.

Each worker learned to perform his job the best way in record time, supervision was cut to a minimum, and costly rejects and rework items on this particular assembly were reduced 80 per cent. In spite of the introduction of new, inexperienced persons into Boeing plants, higher production schedules have been met through the aid of these production illustrations.

Now, when a foreman requests a production illustration, a systematic "assembly line" method of making this production illustration begins in the Tooling Department at Boeing. Clerical details are expedited by expert planners. The job is cleared for preliminary investigation by the liaison division of the planning unit. Liaison technicians examine parts listings and engineering blueprints, and estimated the amount of information necessary to produce an efficient illustration. Research is then carried into the plant, to the specific job. Actual operations are observed and notes and sketches made. Back at his drawing board the liaison technician translates written notes and sketches into a complete plan for an efficient illustration.

Considerable attention is concentrated on the correct sequence of operations, with parts sketched in positions as seen by the workman. Thus

a workman may readily see that one phase of the job must be completed before adding additional parts to the assembly, while in other instances a portion of the work which must be left in a state of partial completion to expedite the installation of another part at a later stage of assembly.

Next step in the operation is performed by the Production Illustrator, a specialist in a particular phase of production drawing, such as sub-assembly, installation, fabrication, preliminary design, tool, or special assignment illustrations.

In addition to a job request, the illustrator receives a standard form listing the number and title of job, the name of the planner, location sketch showing the relation of the assembly or parts to the aircraft and a compre-

hensive layout suggesting methods of presentation, the number and the size of the pages. Also included are all engineering blue prints concerned, a list of parts, sketches, notes, and miscellaneous reference material. Any request from the illustrator to the planner for additional material bears a top priority rating.

When the illustration has been completed, it is sent to a checking unit, where a rigid accuracy test against engineering blueprints is made. Routed to a production line, via the planning unit, the illustration receives approval by the shop supervisor, and is then released for use in the shop. Deviations on engineering drawings that affect the illustrations unit are speedily handled by the planning unit.

The Boeing type, instead of a single exploded drawing, contains first an overall drawing of the parts or assembly when completed, then various pages devoted to the operations which must be performed in sequence to produce the finished job.

Difficult control installations, such as wires and tubing runs are greatly simplified by means of a perspective location sketch of the aircraft showing the run in a diagrammatic fashion. The location sketch is then broken down into a series of smaller units and each fully illustrated on a separate page. All pages are then bound together into a loose leaf booklet. New pages may be added; deviation changes of a minor part need affect only the page on which it appears.

THE END.

PRODUCTION ILLUSTRATIONS SPEED THE B-24-E AT FORD'S WILLOW RUN

RALPH E. DAVIS

IN JANUARY 1941, when Edsel Ford and the auto firm's production chief, Charles E. Sorensen, flew West to study bomber manufacturing in Consolidated Aircraft's San Diego plants, they noticed the extensive use of production illustrations.

They knew what a deterrent to production blueprints can be when "new" workers first must be instructed in reading them, and were convinced these drawings would help get assembly under way quickly at Willow Run.

Tooling from scratch presented an almost superhuman undertaking as there are more than 10,000 machines and fixtures under one roof at Willow Run. Thus engineers not only were juggling a complicated product, but layout for the world's largest bomber plant. Ford men found especially helpful a group of about a dozen engineering-artists who visualized the plant in a series of perspective drawings, all in precise scale.

AFTER the artists made clear what top production executives wanted, machine, jig and fixture designers, even the building architects and contractors, used the illustrations as a common meeting ground.

Engineers point out that the drawings were especially useful to designers of production fixtures weighing as much as 30 tons, as long as 75 feet. A multitude of conveyors and holding devices were depicted first in perspective sectional drawings, then in detailed engineering drawings.

Meanwhile the staff also devoted its talent to depicting in cut-away style the numerous assemblies of the bomber itself. This giant ship will be represented by



Working in a temporary room in the old Ford Airport hangar, these men were among those who executed the motor builder's first production illustrations for the B-24-E.

about 90 drawings when the artists finish their work. Sixteen men are so engaged at the present time.

As each bomber moves along the Willow Run final assembly line, it is accompanied by its own set of production illustrations. When changes are made in specifications, they are noted on the drawings. Thus, deviations are much more clearly understood by workers as well as when recorded in the usual deviation records. The entire set of illustrations used in assembling the plane accompanies the completed ship. Later, this record may be invaluable help when repair work must be done in some far-off battle zone.

Welded Construction in Modern Tool Room

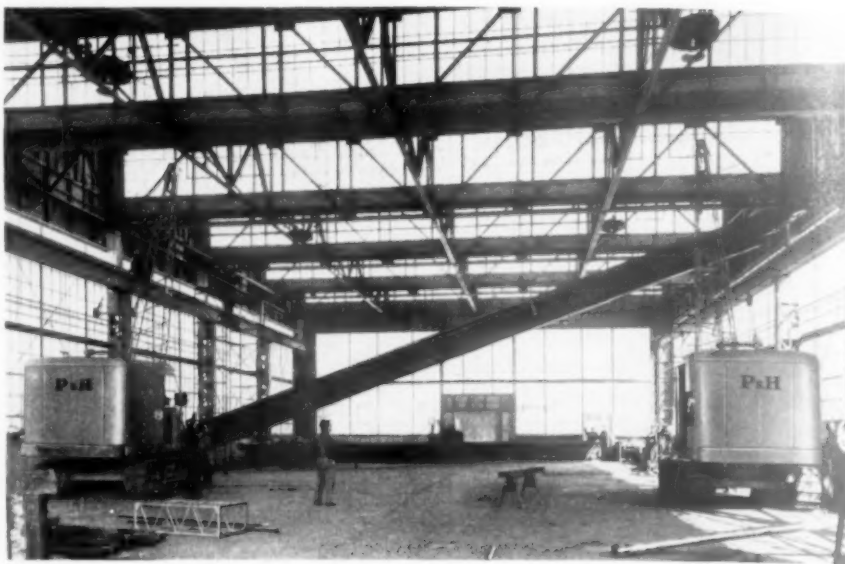
Numerous savings achieved through use of all-welded construction in modern tool room.

MOST PUBLICIZED use of welding in speeding war production to date has been in merchant ship and armored tank construction.

Equally interesting, however, are the applications of welding techniques to structural steel fabrication in plant construction and heavy machinery manufacture for war work.

When Harnischfeger Corporation, Milwaukee, Wisconsin, recently moved into the biggest production program in its history to meet war's demands for such equipment as excavators, overhead travelling cranes, hoists and welding equipment, it became apparent that the existing tool room was actually a bottleneck to greater output. Its facilities were inadequate and it was constantly jammed.

A new tool building was the only answer. Though it was needed "yester-



Interior of Harnischfeger's new tool room completed by the corporation in seven weeks through the use of all-welded construction. Cranes which helped in the building erection are shown lifting the 60-foot overhead travelling crane onto its runways. The crane will move heavy dies and machinery.

day", it was estimated that ten weeks would be required for completion.

Yet, seven weeks from the day the plant engineering department started

work, the building was completed and in operation. The result was not a make-shift structure, but one of modern design complete with the latest type equipment available.

As welding permitted the use of salvage building material, eliminating a wait for special steel, construction was started without delay. Allan G. Wallsworth the corporation's plant engineer, gives welding full credit for saving three weeks' construction time as well as numerous other economies on the job.

During construction, tests were made of the comparative advantages of welding versus other methods of steel erection. These tests, they believe, conclusively demonstrated the greater flexibility, time-saving and structural strength of welded fabrication.

Dimensions of the new tool room, which has a sawtooth roof, are 60 by 120 feet. Construction is entirely of glass with the exception of the sawtooth ends and a four-foot strip at the base of the building. Coolite was used on the west and southern exposures.

Among the interesting machines installed to speed tool room work is a 10-ton floor-controlled overhead travelling crane spanning the full width of the building to facilitate the handling of heavy dies and machinery.

THE END.

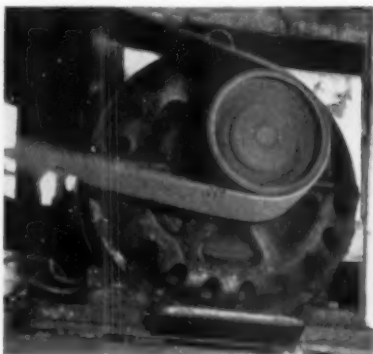
THE TOOL ENGINEER

1907 MOTOR STILL RUNS MACHINE TOOLS

● MANY MACHINES that saw service in the war a quarter-century ago are on the job today. An interesting example of this was discovered recently at the small Arlington Machine works near Boston, where

Veteran of two wars is this 35-year-old, 1,120 rpm, 7.5 horsepower motor used to operate 22 machine tools on war production. The original bearings have never been replaced though the motor shaft has made more than 5,000,000,000 revolutions.

Westinghouse Photo



all the machine tools have been powered by the same induction motor for the past 35 years.

Rated at 7.5 horsepower for 200 volt service, this Westinghouse motor now, as it did during World War One, supplies motive power for the production of critical war materials. Today the motor is powering 22 machine tools including five engine and screw cutting lathes with swings of from 13 to 42 inches, two planers with 13- and six-foot beds, milling machines, shapers and grinders. All are belted to a main line shaft.

Although the motor has been operating on the average of 45 hours a week for the past 35 years, no maintenance other than semi-annual greasing has been necessary. About nine years ago replacement bearings were purchased but never installed. Despite the fact that the motor has never been cleaned, all original parts and wiring are still retained.

The Convention in Retrospect

A. E. (Handy Andy) RYLANDER

WELL, it's done, over with — the Super-Super Colossal War Production Conference of the American Society of Tool Engineers. The superlatives are entirely in order and express my own impressions of what I saw and heard.

Adrian Potter, home town boy who went to the Big City and came back with ten thousand Tool Engineers — or their proxies — has earned his niche in the local Hall of Fame. *Ave!* Ditto Frank Curtis — *i.e.*, the *Ave.*, Frank put his end over on a milk diet, according to rumor, but oh, the potency of lactial fluid! Milwaukee take notice. Of course, Frank had a bit of help, his fellow Yanks John Lindegren, Irwin Holland and Carl Rising sharing the chores of organization along with a lot of others whose names didn't get into bold print. All the same, it was a grand show, wonderfully organized, and all concerned stand up and take a bow.

FIRST OFF, the Directors Meeting, somehow smoother than previous sessions. Perhaps this was due to the broader experience of veterans, bearing out my contention that Directors should be elected for a two year period, alternating. Past prex Bill Smila proxied for Don Flater, but outside of that I think all incumbents were present. Deacon Sprott of Tennessee was back, and reliable and steady Gene Bouton. L. M. Cole of Houston was new to me; also Bill Asmus, of the Coast.

Clete Briner functioned as of old, and the same can be said for John Lindegren, Irwin Holland, Bill Brown. Good, solid citizens. I didn't have to play the Pied Piper for Rochester, as Ray Morris wired me; Cecil Lucas led the charge of the Rochester Brigade. Ed Dickett, of course, is a veteran, and Singer of Toronto knows his A.S.T.E. onions by now. Another swell guy who runs to the quiet side.

The rest, Fred Diehl, Paul Frankfurter, John E. Gilchrist, Fred Dawless, W. J. Frederick, and Horace

Wentzell were new to me as Directors but looked good in action. Don't recall seeing C. D. Thomas or Walter Kassebohm, but then, I'm not old Eagle Eye. Anyway, it was a good meeting, lasting far into the night.

Come to think of it, I made no mention of the Executive Committee, but that's hardly necessary. They were there! So was Bob Lippard, urbane as ever and still in possession of all his hair, the lucky devil. Of the rest of the Committee Ch'men, Earl Johnson, and Yrs. Truly were present, the latter battling for Roy Bramson who was delayed a day.

Joe Siegel missed the boat, and Arthur Murray proxied for E. W. Ernest. Brad Peirce got an award for Membership at the Big Banquet, and the Directors voted rising thanks to the Editorial Committee. I took the bow (in private, of course) in behalf of my fellow scribes. John Lindegren, Al Mitchell, H. E. Collins, Walter Ringling, Milton Roessel, William A. Dawson and the staff of the Bramson Publishing Company please accept my thanks for your cooperation.

BROWSING around the town, everywhere meeting Tool Engineers. Radermacher from Milwaukee, and Bill Eikel! Oysters and fish, building up reserve for the lean years. More fish, more oysters. Window shopping — and walking in and buying it. Got to remember the womenfolks back home. A stroll through the museums; wished I could have had more time. Antique shops; tempted by some old guns, but by the time I'd made up my mind the place was closed. Al Sargent. A hard worker for the A. S. T. E. when it needed support. Arnie Thompson, and his Canadians.

Ray Morris had promised to take me down to Hartford to meet John Sundkvist, erstwhile shopmate of mine at Pratt & Whitneys, but got shunted off. Not being able to bring the mountain to Mahomet, he brought John and

(Continued on page 106)

Tool Engineers' Task is Only Beginning

AT the Springfield Conference of the A.S.T.E., Colonel Earl McFarland, Ordnance Department, and Commanding Officer of the Springfield Armory, was presented with the Society's "In Appreciation" Award for his cooperation.

"I feel it an unusual honor", said Colonel McFarland, "to have received this Certificate of Appreciation from the Society of Tool Engineers for, sincerely, I feel that no other single group in the entire United States has done as much to forward the productive war effort as have the tool engineers of this country".



COLONEL MCFARLAND continued: "It is interesting and it seems to me particularly fitting that you should have your war production conference here in Springfield, in the heart of New England, for in this very neighborhood and right here, were the first steps taken to secure interchangeability in manufacture by proper tool design. Old Thomas Blanchard, an employee of the Armory, completed here in our shops the first stock turning lathe — forerunner of the many machine tools now operating on the principle which he thought out here in Springfield in 1820. Not many miles away, Eli Whitney developed the original milling machine. And across the line in Connecticut, it was Simeon North, pioneer pistol manufacturer, who in 1813 had inserted in his Government contract, the following:

'The component parts of pistols are to correspond so exactly, that any limb or part of one pistol may be fitted to any other pistol of the 20,000.'

"I think I can safely say that the entire productive effort of war begins with the Tool Engineer. We could not have begun to turn out the weapons for battle if you had not provided first the means of making those weapons. Yours is not a spectacular place in this conflict. There are no bands, no waving banners, and no medals, but behind every gun and every plane and every bomb from the time it is raw material until it becomes a finished product lies the genius of the tool designer. And the holders of the Army-Navy "E" Award for production largely owe that honor and the success of their war undertaking to the effort, skill, and ingenuity of you tool engineers who thought out the ways and means of getting the job done.

"You all know only too well that your task is only beginning. We will win this war by producing more weapons and better weapons; and perhaps with less material per weapon; and getting these weapons in the hands of our well trained troops.

"As the war goes on, there will be new weapons, and it will be your vitally important task to design the tools to make them.

"Your Society and its members have developed outstanding advances in methods of processing materials for normal use. In war, the experience you have had in time of peace, is put in guns, tanks, planes.

"The Armory realizes and appreciates your contribution to its war effort. Tool engineering is aiding immeasurably in achieving the victory."

COLONEL MCFARLAND was graduated from West Point, and received an M.E. degree from Worcester Polytechnic Institute. He is holder of a Distinguished Service Medal, presented for service in connection with the development of machine gun production.

CONFERENCE HIGHLIGHTS

PHOTOS BY THE BRAMSON PUBLISHING COMPANY



Left — Materials Substitution Session Chairman J. B. Savits, Pneumatic Scale Corp.; and Speakers P. S. Carswell, and C. H. Whitlock, Monsanto Chemical Co.

Below — Arthur A. Merry, Pratt and Whitney Aircraft; Dr. A. B. Kinzel, W.P.B.; and Larry Lang, National Tool Salvage, discussed tool conservation.



A.S.T.E. President Otto Winter passes the biscuits to Vice-President Ray Morris at the Conference banquet.



After technical sessions, engineers crowded to the speakers' platform to examine exhibits and question speakers. Here they are studying plastic jigs and fixtures used in aircraft manufacture.



Col. H. B. Hambleton, Office of Chief of Ordnance, lent military atmosphere, spoke on gages.



C. G. Nelson, 26 years old and youngest man to deliver a paper, came from Colt's Patent Fire Arms.



Typical conference scene is this knot of engineers discussing a war production problem. H. C. McMillen, G. M. Aero Products; W. J. Phaneuf and O. W. Bonnafa, Lapointe Machine Tool Co.



West Coaster, W. F. Asmus, Consolidated Aircraft, spoke on plastic fixtures.



Representative of the Lone Star State was L. M. Cole, registering from Houston.



War Tooling Session speakers were G. G. Swebilus, The High Standard Mfg. Co.; R. F. V. Stanton, Pratt & Whitney Division, Niles-Bement Pond Co.; O. W. Winter, A.S.T.E. President; and E. A. Clark, Budd Wheel Co.



H. B. Stevens, F. Blankman and R. P. Stevens, Onondaga Tool and Salvage Co., study one of the Conference displays. The method shown was described in the October Tool Engineer.



C. C. Gorham, Greenfield Tap & Die Corp., was chairman of the technical session on training in industry. He is shown answering questions posed by manpower-troubled engineers.



Brig. Gen. G. H. Drewry, Chief, Springfield Ordnance, and H. Stevens, Colt Patent Fire Arms, at banquet.



Col. E. McFarland, Springfield Armory, and T. H. Beck, Crowell-Collier Pub. Co., chatting at the banquet.



Among the 800 men who travelled to the Massachusetts city for the A.S.T.E. War Production Conference last month was a strong

contingent from Canadian Chapters. Others, who left jobs in war production plants, came from as far as Texas and California.

(Concluded from page 103)

his young brother Eric to Springfield. Good to see them again, Vic Erickson from Norton — a brief gathering of the Swedes. "Anderson and Peterson and Lundstrom and me". John S. will get that. Greetings from Norman Brownsword, now in Boston or thereabouts. A birthday card from Jack Sylvester! Thanks, Jack.

The Syracuse gang, 23 strong. Wanted to get their pick at the banquet, but Marty Barry had sat down and Al Mitchell was busy drinking buttermilk, so I lost 'em in the crowd.

Boston Chapter adopted me, which reminds me that the Canucks were going to make me an hon. member of Toronto. Or was it Montreal? Ah Wilderness, I think of thee — betimes! Long distance commuter honors go to W. J. Sargent, member of Hamilton Chapter who came 1800 miles all the way from Fort Williams, Ontario.

A letter from Rip Collins, down in Houston. Thanks, Rip, for a pat on the back! I think H. Q. is lining up speakers for you. But how about home talent? Or does a guy have to go to another town to be appreciated?

MET Walter Pohle of Boston at the P. & W. levee up in d'Arc's room, all enthusiasm.

Ernest Cheyne and Joe Barnett of



Bramson Publishing Company Photo
John Sylvester, Pratt & Whitney, chats with A.S.T.E. Editorial Chairman A. E. Rylander, Midland Steel Products, Detroit.

Goodyear, Akron. Joe is stepping along, hard on the boss' heels.

Capt. Comroe of Boston, proclaiming his Swedish ancestry since he met me. Skoal, Captain! Wally Scotten of THE TOOL ENGINEER and his camera, choosing his shots. Fine boy, that! Jim Eng, shortest name on the list. J. V. Moffett from Auburn Spark Plug, who has contributed to THE CRIB. (See, you do things and I mention you). The Smiths, all seven of 'em.

Say, here's one! A. H. Ojerholm of Norton Company! The Mrs. has mentioned the name many a time. Never dawned on me until now, but are you the guy that pulled her pigtails in school? Write and let me know. Missed the Duke (Fred Schytte) and his consort. Also missed Ed Berry of Little

Rhody, although he was here. Greetings, Ed. Kirk Kirkorian and Lars Larson, alliteration in brunette and blonde. What, no Swansons!

THE BIG BANQUET! Scads of people. All happy, never so many at an A. S. T. E. banquet before. And the best dinner yet! The Bigwigs and Brass Hats basking in spotlight, introductions and awards. Frank Curtis got his life membership; deserved it for his work in organizing the Convention if for nothing else. Door prize won by F. H. Robertson of Boston Chapter. Swell! Have a good time on the green, Robbie.

Thomas Beck of Collier-Crowell illustrating the Open Mind with a gadget talk. Very interesting speaker; look forward to a rejection slip from him sometime — or maybe a check.

I've had lots of pleasant surprises of late. Floor show, finale — and out in the rain! Got all wet but Horace Wentzell saved my life with a la the Scotch route. Incidentally, met his charming life partner. Bring Mrs. W. to Milwaukee, Horace. And that, gentle readers, will be all for now. It's not that I've run out of steam, but the book's made up and there just ain't no mo' space. Look for more next March, when we trek to Milwaukee.

HANDY ANDY.

The Greatest Gift is an Open Mind

WHEN we talk about America, we brag about the number of motor cars, refrigerators, telephones, radios, things that other nations don't have in equal quantity or at such small prices.

That is due to tool engineers and machine tools, the greatest conservators of man's most precious asset, irreplaceable time.

I count it fortunate that, Hitler, and his side partner, that Son of Heaven should have picked upon a mechanical war because, in that, we are certainly superior to all others. But I realize also that Tool Engineers and the scientists in the laboratories behind them, are in a constant battle with

THOMAS H. BECK

PRESIDENT
CROWELL-COLLIER PUBLISHING COMPANY



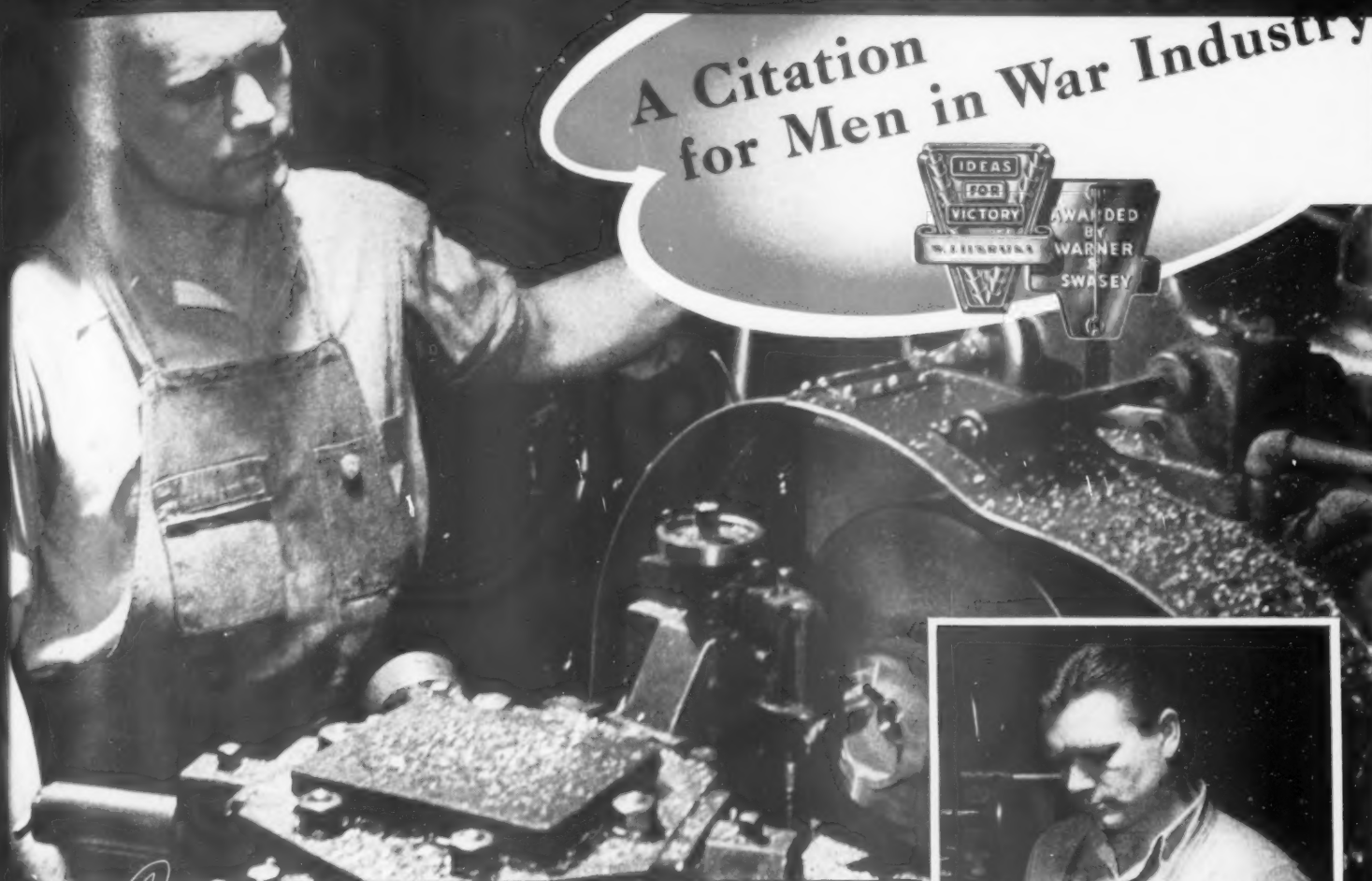
our closed minds.

A short time ago Colonel Lord, of the U. S. Engineering Corps, pointed out the feasibility of 70 ton cargo planes. Their skins were to be made of stovepipe iron, of which I understand we have over 600,000 tons annual capacity not now being used. We are going to try out three.

Mr. Kaiser never built a ship until this war started, and he is now reducing the time to fourteen days for a completed ship.

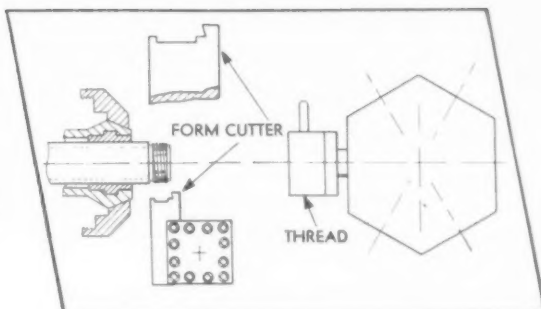
He is building a number of commercial aircraft carriers, 18,000 tons, about eighteen knots, — an ordinary cargo ship with a flat deck and the
(Concluded on page 109)

**A Citation
for Men in War Industry**



Ideas for VICTORY

—from the Production Lines
behind the Firing Lines



He Increased Production 33 1/3% by Developing a Forming Tool

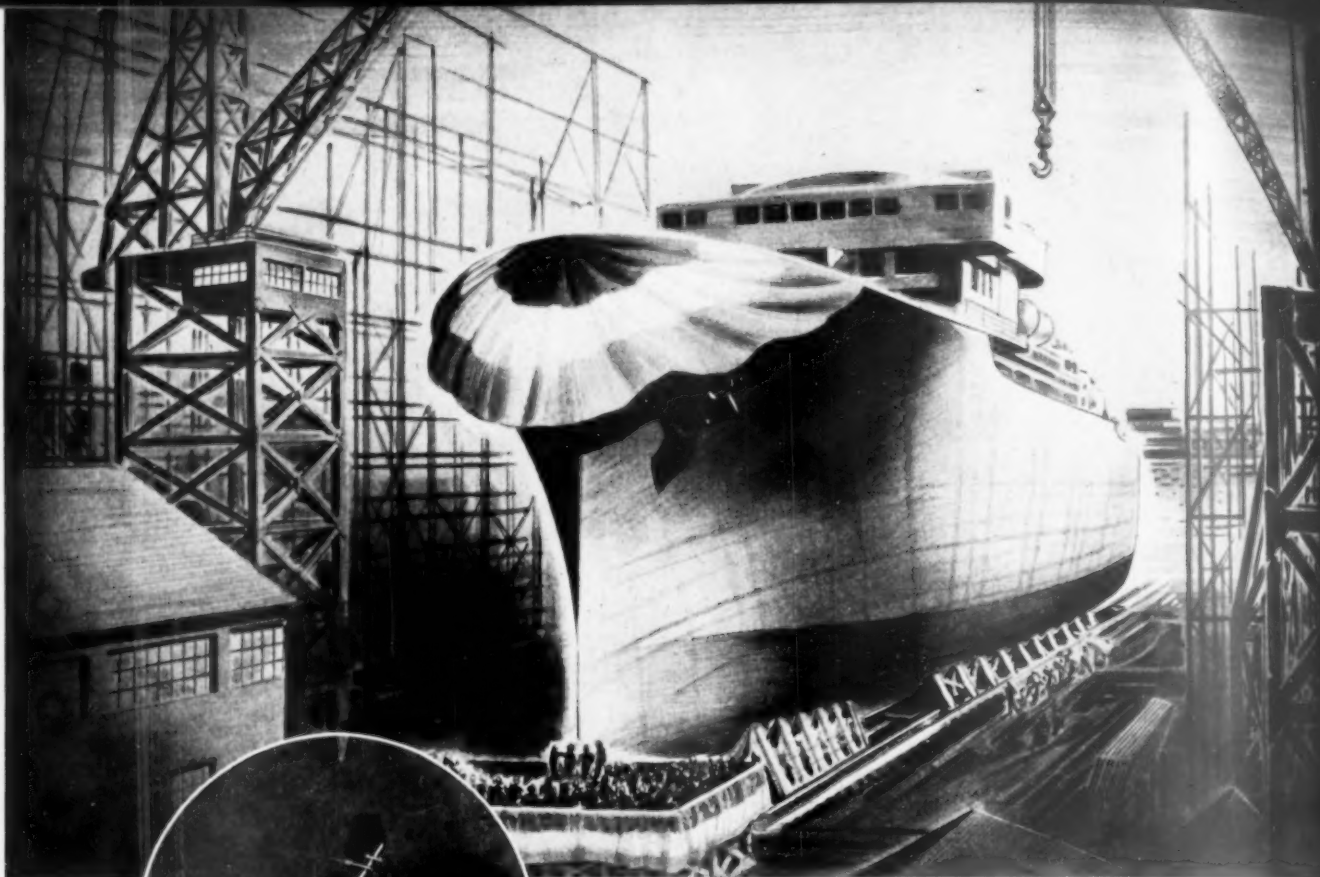
Operator W. J. Lukafka who works for the A. W. Cash Company, Decatur, Ill., was turning a brass tubing job with two knee tools and a die head in the hex cutter and a facing tool in the cross slide.

The sketch shows how by developing a forming tool, he was able to combine the turning and facing cuts into one operation from the cross slide. The die head completed the job. Indexing was eliminated. Time saved! Production stepped up a third!

Many such ideas from patriotic operators are sent to us. In recognition of their initiative and resourcefulness, we are proud to present these men with a gold Victory pin. These "Ideas for Victory" are published in "Blue Chips", a shop bulletin sent free by Warner & Swasey to thousands of turret lathe operators. Make sure your operators are getting "Blue Chips" at their homes. Write Warner & Swasey, Cleveland, Ohio.

W ARNER & SWASEY
FOR VICTORY

**YOU CAN TURN IT BETTER, FASTER, FOR LESS
...WITH A WARNER & SWASEY**



Making measurements on a ship's propeller fin with a Starrett Steel Beam Trammel.



A Starrett Micrometer on the job in an eastern shipbuilding yard.

STARRETT TOOLS

*Are Shortening the Way
to the WAYS*

One reason your supply house may not be able to furnish all the Starrett Tools you want *when* you want them may be found in the shipyards and marine equipment plants of America.

For there, as on every sector of the production front, you will find countless thousands of Starrett Tools helping skilled hands to do the job better and faster.

The makers of the tools, like the builders of the ships, are bending every effort to meet the demands of the emergency. Should procurement of the proper precision tools prove difficult in your case, bear with us and with our distributor. You may be certain of our intention to deliver Starrett Tools where they will do Uncle Sam the most good.

THE L. S. STARRETT CO • ATHOL • MASSACHUSETTS • U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

THE GREATEST GIFT IS AN OPEN MIND

(Continued from page 106)

stacks on one side, and elevators in it. After specifications had been approved by the Navy, they put great gangs of engineers and draftsmen on the job. He told me, "You know, Beck, they never designed a ship that wouldn't float; they never designed a ship that didn't make the speed that was estimated for it. Knowing that to be true, I told them to send me the working drawings as fast as they made them."

At the time, those ships were fifty per cent completed, and he had 51 per cent of the drawings. He certainly has an open mind.

OPPPOSITION to centrifuge casting was terrific. Sorensen, of Ford, told me that was because "casting," meant it must be softer than a forging. But centrifuged steel turns out harder than any piece of forged steel they can possibly make; moreover, the distribution of strain and stress is equal throughout the perimeter and throughout the length. He is making centrifuged castings, engine cylinder sleeves that stand nearly twice the hydrostatic pressure that the forged one does. Moreover, with a forged one, they had to start with an eighty-seven-pound block of steel and machine that down to six and a half pounds, whereas a centrifuged cast blank is only eight pounds and goes down to six and a half pounds and is stronger in the end.

Long before Pearl Harbor, we began to look around to see what we could do to conserve and lengthen the life of the metals we used. Well, we have blades on a long press, up to 72 inches long, to scrape excess ink off a copper cylinder etched to not more than one-thousandth of an inch. They have to be true throughout the entire length, and are held in a big gripper while the cylinder rotates against the blade. Those blades were supposed to be made of Swedish steel. We found a crucible that could give us the same or better on analysis, but, of course, we couldn't get that because of scarcity. We tried all sorts of other things. Finally our Chief Engineer went to work on plating chromium directly on steel with no nickel or copper, and he finally hit it.

We used to change these blades, there are six of them in a press, every

eight hours — about 70,000 impressions. Every time we took one out and put in another, there was a half-hour delay. Well, we print 60,000 12-page signatures in four colors on one side and two on the other, in these presses, per hour, so the change of a blade meant the loss of a half-hour's production, or 30,000 12-page signatures. These have now run the full length of the run. We don't know how much longer they could go. We change them at the end of a run because they have to work with another set of cylinders. That means they do 1,200,000 impressions against 70,000.

WAR PRODUCTION CONFERENCE

(Continued from page 81)

tion. Not disposed to the usual convention frivolities, they came to listen to purely technical discussions of production problems by 22 experts.

SUPPLEMENTING six technical sessions, which were followed by long discussion periods, were numerous industrial displays and a series of moving pictures on the use of tools, metal cutting and metal fabricating.

O. W. Winter, youthful president of the society, dramatized the significance of this gathering of engineering minds when he opened the first meeting. "Hitler, the Son of Heaven and Mussolini would give their right arms to enlist the 11,000 A. S. T. E. membership" he said.

Basing his statement on government figures on skilled manpower requirements, Winter pointed out that the country is faced with a deficit of more than 60,000 trained tool engineers. There is a demand for 75,000.

Though, ostensibly, the Tool Engineer's job is the facilitating of production through the use of machines and tools, T. O. Armstrong, Industrial Relations Manager of the Westinghouse Electric plant in Springfield, said, "Your job is also one of searching out new, better and quicker ways of doing things — simplifying jobs, making it possible to make use of the labor supply that is available. The War Manpower Commission estimates that at least 95 per cent of all training . . . must be done right on

We tried plating bits in our repair shop, with .0002-inch on the tips.

We sent them to the Pittsburgh Steel Laboratories for their physical tests, and our bits and drills, did from four to eleven times as much as the unplated.

We drilled one inch of standard naval armor plate with a 7/16ths drill, drilled a hole in forty-two-and-a-fraction seconds. We told that and other things in an ad in two of our publications. We got thousands of inquiries right away. There were a lot of open minds — over four hundred industries are now using it, because one of the most precious things is man hours.

THE END.

the job."

Arnold Thompson, Chief Tool Engineer of the Aircraft Division of the National Steel Car Corporation, Ltd., Canada, reminded American engineers that they had a long way to go before they equalled the British achievement in complete utilization of manpower. "Of all the people engaged in the Royal Ordnance Factories in Great Britain," he said, "60 per cent are women."

THOUGH every speaker at the technical sessions held the interest of engineers with their practical solutions to the stark reality that we are reaching the bottom of the barrel of available supplies of top-grade materials for tools, Elmer A. Clark, vice-president of Detroit's big Budd Wheel Company, brought listeners to the edges of their chairs with stirring revelations of the 100 per cent conversion job the motor capital has done.

The complete sharing of every previously well-guarded trade secret, he revealed, was largely responsible for the success of the undertaking.

Climaxing the two-day session was a banquet spread for 800 in Springfield's huge Municipal Auditorium. There, Thomas H. Beck, dynamic president of the Crowell-Collier Publishing Company told Tool Engineers. "You are in a constant struggle with the closed minds of America."

THE END.

MILLING ACCURATE KEYWAYS



TIME REDUCED 50%

USING A **GORTON**

SUPER-SPEED VERTICAL MILLING MACHINE *with a Simpler, Faster Set-Up*

MILLING ACCURATE KEYWAYS on airplane engine impeller drive shafts is done on a Gorton 9-J Miller in half the former time (6.3 minutes per piece floor to floor), holding a tolerance of $\pm .001''$.

The keyway is .188" wide x .440" long, having a .020" radius in the bottom corners. A two-flute end mill is run at 2800 r.p.m. This continuous high speed is made possible on the Gorton Super-Speed Vertical Miller because it has precision pre-loaded bearings, perfect balance, and rigid design. After each

fifty pieces, the cutter is re-sharpened on the Gorton 375-2 Cutter Grinder, which not only resharpens the cutter flutes, but forms the .020" radius as well.

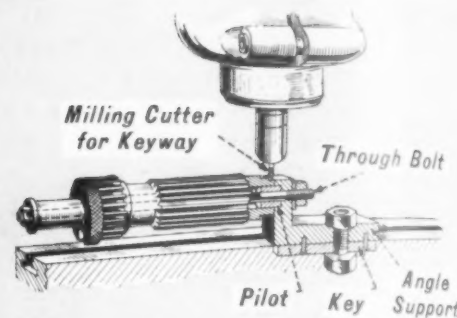
This is but one of many examples of how Gorton Super-Speed Millers and Gorton Cutter Grinders save vital hours of machining in aircraft and other plants producing war equipment. Perhaps our engineers can assist you in saving additional time on your high-speed milling. We will be glad to make recommendations—no obligation.

GEORGE **GORTON** MACHINE CO.

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49 Years

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING



DEVELOPS A QUICKER WAY TO DO THE JOB

A milling department leadman in a big aeronautical plant, William Van Way, has worked out this simpler, cheaper, entirely adequate Fixture for holding hollow impeller drive shafts. Sketch shows details. Only a few simple items are needed. An angle support has a tongue, fitting in the table slot. A bushing on the vertical leg centers the shaft, which is held by a long bolt through the shaft and bushing. The depth of the milling cutter is set by a thickness gauge from top of fixture. This effective device replaces the previous expensive set-up, reduces loading and unloading time to minimum.

SUPER-SPEED MILLING DATA

OPERATION—Mill Key Slot .188" wide x .440" long, .020" radius in corners.

MACHINE—Gorton 9-J Super-Speed Vertical Miller.

PART—Gear Impeller Drive Shaft.

CUTTER—2-Flute, High-Speed Steel End Mill.

HOLDING—Simple Special Fixture as illustrated.

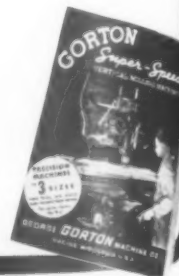
FEED—Hand.

SPINDLE SPEED—2800 r.p.m.

FLOOR-TO-FLOOR TIME—6.3 minutes.

FREE

Write for your copy of Bulletin 1400-B covering Gorton Super-Speed Vertical Milling Machines. It explains their 8 exclusive advantages for handling work faster and cheaper. Used for milling dies, molds, and miscellaneous or production work.





CAPITAL COMMUNIQUE

JAY A. BONWIT

Washington Correspondent for
THE TOOL ENGINEER

WPB shuffled with view toward stabilizing production. Shortages in materials and labor are still baffling. War plants feeling squeeze; must find substitutes. Price control, contract re-negotiation to the fore.

WAR PRODUCTION BOARD is being reshaped, giving the military services greater control over materials.

Major personality involved is Ferdinand Eberstadt, who as WPB Vice-Chairman in charge of Program Determination, will be responsible for keeping a mass production war industry operating at capacity levels.

The production lines that have been established are those on which our war effort will depend. There is little likelihood of further conversion of smaller plants and civilian plants to war work.

Tendency now is to stabilize war work to balance off production schedules, and finally to achieve a degree of "normalcy" in war production.

★ ★ ★

THERE has been a marked change in conditions. Less than a year ago, war production was a minor phase of the total industrial picture. To obtain quick production of war goods, the Government virtually wrote blank checks in the form of contracts, and gave uncontrolled priorities on materials. Result was that in-

dustrial plants swung into production on parts and sub-assemblies with a minimum of planning.

Gradually, a semblance of control was instituted to bring production of parts and sub-assemblies output into ratio with assembly of the end item. As material supply became more limited, priorities regulations were issued to bar civilian use. Currently, this "squeeze" process has brought civilian production to a minimum.

Still the shortage of materials persists, and in addition a new and more pressing problem has developed —

PRICE OF CARELESSNESS

● AMERICA'S record, so far as industrial accidents are concerned, is appalling. This is the opinion expressed over the name of the Under Secretary of War, Robert P. Patterson. Production for the first six months was hampered by a frightful casualty rate: Every 20 minutes a worker was killed . . . every five minutes another permanently disabled. For a full year, this would mean 20,000 killed, 90,000 permanently disabled, and 2,000,000 others hurt.

shortage of labor. It can be generally assumed that this shortage of materials and labor will continue through all phases of the war economy, and become more acute.

No simple solution will be found. No immediate final remedy is available. The plans now formulated to control materials will be subject to numerous changes, and there is no accurate picture available of what controls will be necessary in the later stages of the war effort.

★ ★ ★

ONLY MEANS of saving materials is through conversion from critical materials to less critical items. War production is now undergoing the same pressure exerted on civilian production during the early stages of the war economy. At that time, the Office of Production Management stressed the need for civilian industry to convert from the use of critical materials to materials in good supply.

Same effort is now being made in war industry. War materiel producers are being shifted from use of nickel steels into lower alloy NE steels — from use of copper alloys to iron and steel. These measures are aimed at

(Continued on page 112)

(Continued from page 111)
conservation of materials.

At the same time, in order to conserve critical tools and manpower, war materiel is being redesigned with two objectives — (1) *to eliminate man hours of work by simplifying the product*, and (2) *to switch from operations that require machines that are short to facilities that are in good supply*. To accomplish the latter, stress is being placed on shifts from forgings

to stampings and extrusions.

Redesign will be largely the concern of the branch of the armed services using the product. Moreover, the services will be forced to redesign as a means of conserving their allocation of critical material. They will be assigned a "budget" of materials, and to obtain a maximum of required end product they will have to stretch their material as far as is humanly possible.

National Emergency Alternate Steels

DESIGNATION	CHEMICAL COMPOSITION (b)				
	C	Mn	Mo	Ni	Cr
NE8024	0.22-0.28	1.00-1.30	0.10-0.20	....	....
NE8124	0.22-0.28	1.30-1.60	0.25-0.35	....	....
NE8233	0.30-0.36	1.30-1.60	0.10-0.20	....	....
NE8245	0.42-0.49	1.30-1.60	0.10-0.20	....	....
NE8339	0.35-0.42	1.30-1.60	0.20-0.30	....	....
NE8442	0.38-0.45	1.30-1.60	0.20-0.30	....	....
NE8447	0.43-0.50	1.30-1.60	0.20-0.30	....	....
NE8547	0.43-0.50	1.30-1.60	0.20-0.30	....	....
NE8620	0.18-0.25	1.30-1.60	0.20-0.30	....	....
NE8630	0.27-0.34	1.30-1.60	0.20-0.30	....	....

Stuart's
Thred-Kut
HEAVY DUTY CUTTING OIL
Recommended by America's
leading machine tool builders

Stuart's
SOLVOL
LIQUID CUTTING COMPOUND
For carbide tools and where
an "aquamix" solution is
recommended

Stuart's
CODOL
LIQUID GRINDING COMPOUND
Meets every test for the Ideal
Modern Grinding Compound

Stuart's
"SUPER-KOOL"
AMERICA'S FIRST TRANSPARENT
SULPHURIZED CUTTING AND
DRAWING OIL

For All Cutting Fluid Problems
D. A. STUART OIL CO.
Chicago, U.S.A. • LIMITED • Est. 1865
Warehouses in All Principal Metal Working Centers

**Will the
Machinability
of NE Steels
prove to be a
Tough Problem?**

THE answer will be "Yes" or "No"—depending upon the skill used in handling the change-over.

Changes may be required in tools and tooling; changes in speeds and feeds, and in cutting fluids. When this last factor is considered

Stuart Oil

Engineering Service

is equipped and ready to help you apply the Right Cutting Fluid to "cranky" steels.



The War Production Board will function largely as a control mechanism to translate the United Nations' military strategy into arms production. The WPB Requirements Committee will balance off the demands of the Army, Navy, Maritime Commission, Lend-Lease, civilian, repair and maintenance. Also, WPB will function to maintain the flow of manpower, tools and materials going into the plants.

★ ★ ★

THE WPB FUNCTION will not always be consistent. In some instances, WPB policy will be to cut tonnages going into civilian production, and then again, such allocations will be stepped up.

It has been decided to "gamble" with the essential civilian industry during the next six months. Civilian industry will have to exercise ingenuity to keep in operation on even essential output and services.

Objective will be to get maximum war output during 1943, and it is considered necessary to cut civilian industry below the level of comfortable safety on even repair and maintenance requirements.

It will be WPB Chairman Nelson's function to gage the extent of the gamble — to see how far the civilian economy can be risked in the interests of all-out war. In this, he will be advised by Price Administrator Henderson, who also heads the WPB Division of Civilian Supply.

Eberstadt will represent the war production viewpoint — with the general outlook that war production comes first, and anything other than war output is worthy of secondary consideration — if any.

★ ★ ★

AT THE SAME TIME, the problem of price control and contract renegotiation becomes of immediate importance. Army, Navy and Maritime Price Adjustment Board policies have led to some question on the part of industry.

Policy of the military services has been to permit industry an adequate profit margin. OPA is not likely to figure to a major degree on price of either finished war goods or sub-assemblies and parts.

(Continued on page 114)

DO'S AND DON'TS FOR OPERATORS USING CARBIDE TOOLS

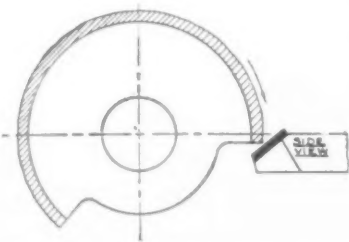
Carbide tools are as easy to use as ordinary types of tools. However, because carbide tools are extremely hard—and therefore more "brittle" than steel tools, certain requirements are necessary in order to protect the carbide tip while in use. When properly used, carbide tools will give you long, continuous periods of cutting, they provide

high quality finish, extreme accuracy, and freedom from frequent tool changes. Here are some of the things you can do to get the most from your carbide tools.

Handy charts containing these hints are available free on request.

New Standard-Design Shear Type Tools

For interrupted cuts on large forgings and castings, the standard-design shear type Carboloy Cemented Carbide Tool illustrated has several outstanding advantages. Designed to protect the carbide tip on this heavy work, this tool takes the



initial load at a point some distance behind the nose, where the tool is stronger. The heavy shear angle causes the cutting edge to literally "slice" into the work, thus reducing impact to a minimum. See new catalog GT-142, page 9.

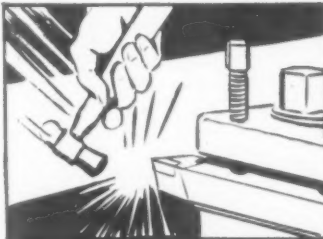
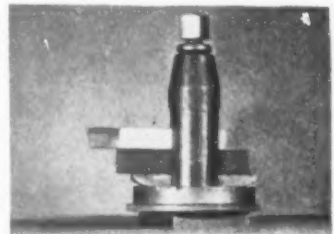
Standard-Design Tools Save Delivery Time

To enable you to order by tool number and eliminate delays for drafting, blueprints, quotations, etc., Carboloy Company now makes available a large selection of standard-design tools. These are former special tool styles for which there previously has been a large demand within a narrow range of minor design variations. Standard designs for these have been established to broadly meet most previous requirements. Standard-design tools represent one of several time-saving features described in the new catalog GT-142. Send for your copy.



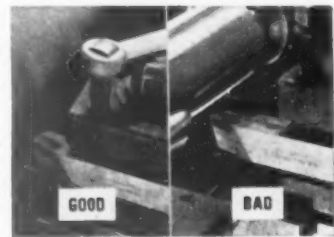
When using holders, use special ones designed to hold carbide tool on a horizontal plane—not tilted upwards.

Don't tilt rocker holders up. Keep tool level and shim up to centerline. Better yet, turn tool post collar upside down to get flat surface.



Don't hammer cutting edge of carbide tools. Blows cause chipping. If necessary, tap tool from rear to bring up to work.

Avoid excessive tool overhang. It should be no more than necessary to allow work clearance and chip room.



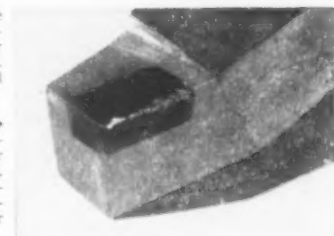
Don't use sharp-pointed or cup-type screws. Grind them flat—using the flat face of a cup-type grinding wheel.

When a coolant is needed—use a heavy flow directly onto tool. During tool adjustments, avoid turning coolant on and off. If necessary run first piece dry.



Always disengage feed first before stopping machine. Never stop tool in the cut. This will cause tool breakage.

Remove tool before it becomes excessively dull, or chipping may result. Best way is to remove tools for sharpening at regular intervals.



CARBOLOY COMPANY, INC.

Sole makers of the Carboloy brand of cemented carbides

11145 E. 8 MILE ROAD, DETROIT, MICH.

Chicago • Cleveland • Los Angeles • Newark • Philadelphia

Pittsburgh • Seattle

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

TOOLS • DIES • DRESSERS • CORE BITS • MASONRY DRILLS • WEAR RESISTANT PARTS

(Continued from page 112)

There is the general tendency on the part of the military services to establish a customer relationship with industry, and as industry becomes accustomed to doing business with the armed services, it is likely that much confusion will be dispelled.

ACTIONS OF IMPORTANCE TO THE INDUSTRY WERE AS FOLLOWS:

- September 16—M-89, controlling

allocation and use of corundum, issued in amended form by WBP. New version includes control over use of corundum in the hands of consumers, and clarifies that the order applies also to corundum ores and corundum superfine flour.

- September 21—OPA issues Supplementary Order No. 20, automatically licensing all dealers selling used machine tools or extras; also requires dealers of second-hand machine tools

Out to Help

Since early February, when he acquired the uniform and three silver stars that denoted his rank as a lieutenant general, William S. Knudsen has visited about 500 war production plants in more than a hundred cities and towns.

As director of Army Production, Lieut. General Knudsen is giving the job the spirit that can be expected of a veteran production boss. To date he has flown more than 55,000 miles to discuss problems of manufacturers.

Only with the **CENTER SCOPE**
can you see to be
ABSOLUTELY ACCURATE!

And only with the **CENTER SCOPE**
is Accuracy so Simple!

Today production is too vital—metals too essential—to risk the waste of both because of inaccuracies in machining. Production accuracy starts in the toolroom. Here the **CENTER SCOPE** enables you to locate to 'within a tenth' regardless of the tolerances on any job. Thus with tolerances to spare—jigs and fixtures last longer in production before wear necessitates re-working. Production is speeded and work is more accurately completed.

On a jig borer, as shown below, or on any machine—the **CENTER SCOPE** gives you at all times visible assurance of accuracy. Write for Bulletin #201 to the **CENTER SCOPE INSTRUMENT COMPANY**, 351 South La Brea, Los Angeles, Calif.

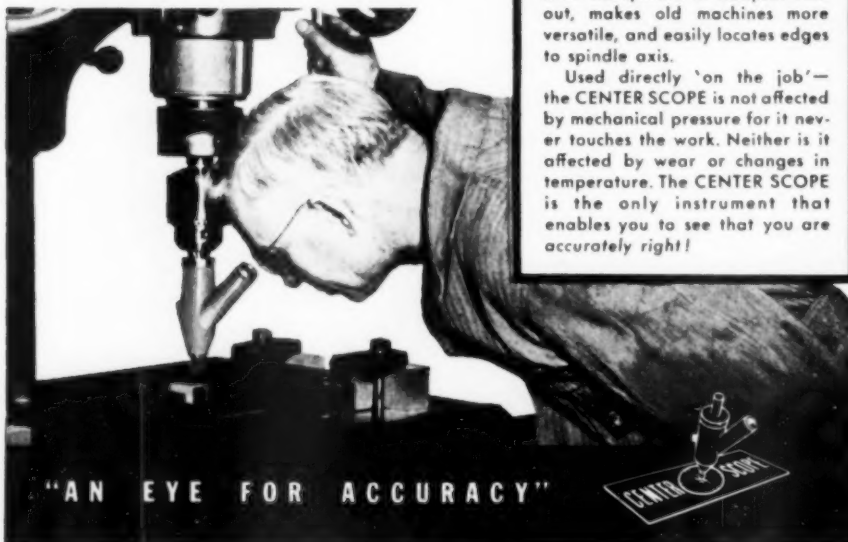


The **CENTER SCOPE**

—is an optical locating and centering tool for use on any machine!

There's no mystery about the **CENTER SCOPE**'s infallible accuracy—it's just a question of enough magnification (45x) to allow you to see 'within a tenth.' It's a rugged shop tool that quickly and accurately compensates for spindle or adaptor run-out, makes old machines more versatile, and easily locates edges to spindle axis.

Used directly 'on the job'—the **CENTER SCOPE** is not affected by mechanical pressure for it never touches the work. Neither is it affected by wear or changes in temperature. The **CENTER SCOPE** is the only instrument that enables you to see that you are accurately right!



to register with the OPA in Washington, D. C., before November 2, by filling out OPA Form No. S020:3. The order provides for suspension of dealers' licenses where there are violations of Supplementary Order 20 or other price actions. Suspension means dealers lose privilege to do business.

- September 22 — WPB announced plan for assignment of high preference ratings by regional offices in cases where lack of a small quantity of critical materials is holding up or slowing down essential production. Regional offices authorized to assign preference ratings up to AAA to prevent positive losses of production, and up to AA-2X for other cases.

- October 2—M-154, governing use of thermoplastics, due to expire October 1, was extended until November 1. A revised order was described as under preparation.

- October 3—WPB revised Conservation Order M-6-b, restricting use of nickel to implements of war and other products certified by the Army-Navy Munitions Board to be essential to the war effort. Specific exemptions may be made by the Director General for Operations. Implements of war were defined as combat-end products, complete for tactical operations, and it was explained that facilities or equipment to be used in the manufacture of such items are not defined as implements of war.

- October 10—WPB issued Conservation Order M-212, restricting delivery and use of petroleum coke to certain essential war uses. Petroleum coke is urgently needed for anodes in aluminum manufacture, for graphite and carbon electrodes, and for other important products.

THE END.

Model 30-HO TWO SPINDLE HYDRAULIC FEED INVERTED DRILLING MACHINE

High production attained in drilling deep holes as large as 4" in diameter. The Baker construction and inverted principle allows ready removal of chips, conserves drills and permits continuous operation. These features are especially valuable in speed drilling for war production.

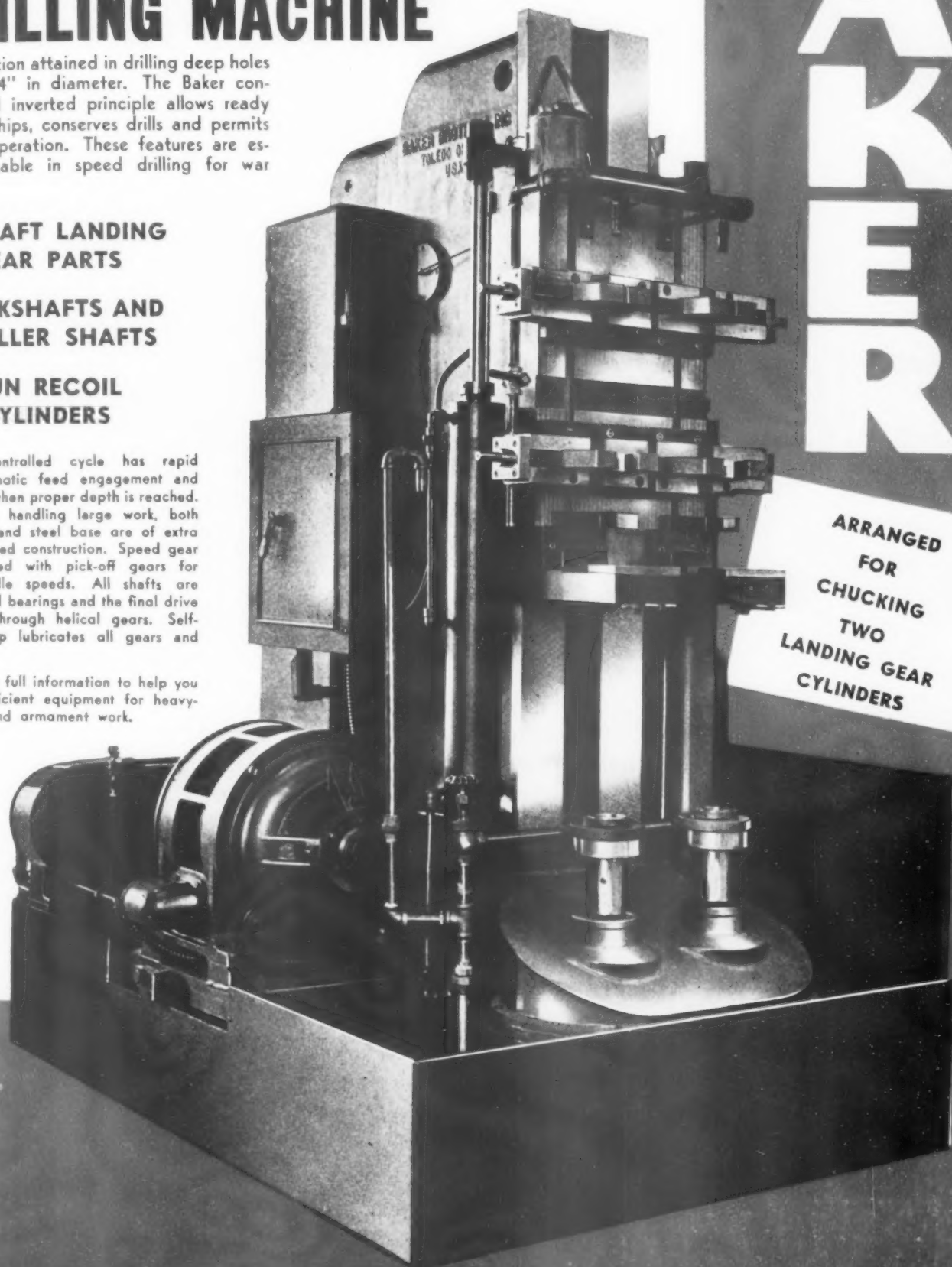
**AIRCRAFT LANDING
GEAR PARTS**

**CRANKSHAFTS AND
PROPELLER SHAFTS**

**GUN RECOIL
CYLINDERS**

Push-button controlled cycle has rapid traverse, automatic feed engagement and automatic trip when proper depth is reached. For rigidity in handling large work, both vertical frame and steel base are of extra heavy, well-ribbed construction. Speed gear box is arranged with pick-off gears for changing spindle speeds. All shafts are mounted on ball bearings and the final drive to spindle is through helical gears. Self-contained pump lubricates all gears and bearings.

Let us send you full information to help you in selecting efficient equipment for heavy-duty aircraft and armament work.



BAKER

ARRANGED
FOR
CHUCKING
TWO
LANDING GEAR
CYLINDERS

BAKER BROTHERS, INC.
TOLEDO, OHIO, U.S.A.

For maximum range in **ACTION**

WINTER TAPS

For maximum range in Action **ACCURACY** is of extreme importance. The reputation of **WINTER TAPS** was built on their long range performance. Winter accuracy eliminates work spoilage by better thread fits—saving vital metal parts which otherwise might be rejected.

A division of

THE NATIONAL TWIST DRILL & TOOL CO.

Detroit, Michigan

Winter Brothers
 COMPANY
 Wrentham, Massachusetts, U. S. A.

Hanna Cylinders



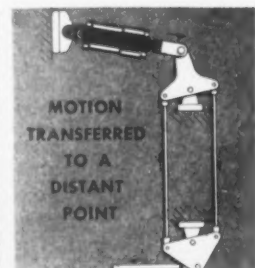
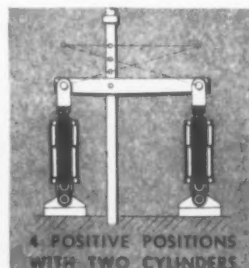
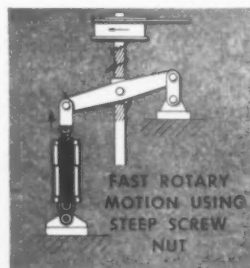
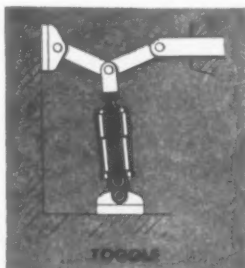
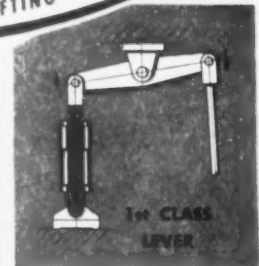
Why not *Cylinder*
use *Power*
on your machines?

.. it is versatile, smooth,
dependable, and easy to apply

THIS Noble & Westbrook Shell Marking Machine illustrates how simply and effectively a Hanna Cylinder can be used to apply power — power that is dependable, easily controlled and economical.

Throughout industry there are thousands of Hanna Cylinders at work on machines and equipment because they simplify and improve operation; they save time and labor; they help increase production. Wherever safe, reliable mechanical power is needed, they can deliver it—either direct, through a lever, toggle, or other mechanical arrangement. Study these illustrations of fundamental movements and you will probably find they suggest adaptations for the use of Hanna Cylinder Power, on your machines or in your plant.

Write for catalog 230, or, if you wish, an Engineer will help you apply Hanna Cylinders to advantage.



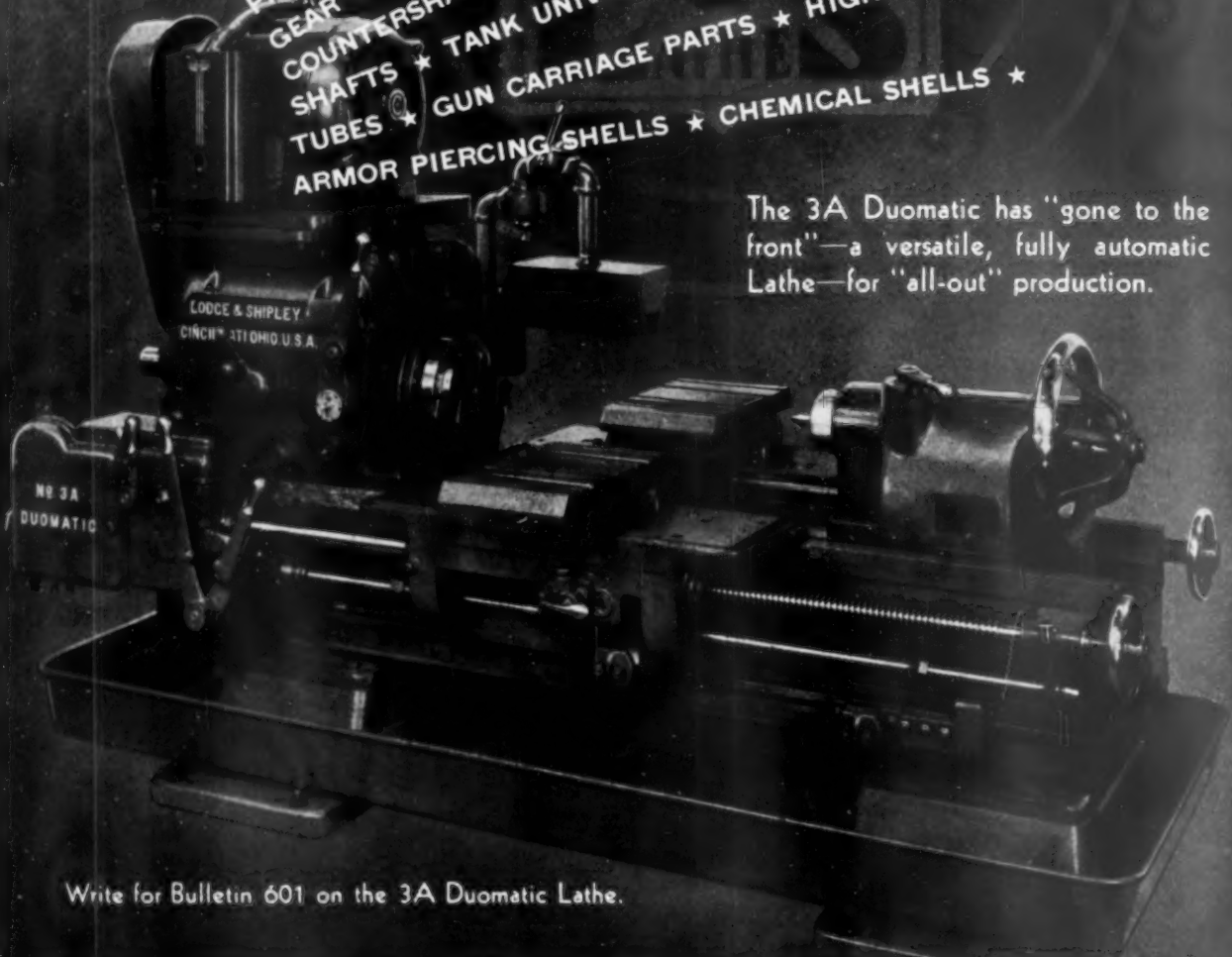
HANNA ENGINEERING WORKS
1765 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic RIVETERS
Air and Hydraulic CYLINDERS
Air HOISTS

We fly the
All-Navy "E"

AIRPLANE ENGINE CYLINDERS ★ AIRPLANE
ENGINE CRANKSHAFTS ★ AIRPLANE ENGINE
PROPELLER SHAFTS ★ AIRPLANE LANDING GEAR
AXLES ★ AIRPLANE LANDING GEAR PISTON TUBES ★
WHEELS ★ AIRPLANE PROPELLER SPIDERS ★ AIRPLANE TAIL
PROPELLER GEAR SEGMENT BLADES ★ AIRPLANE PINION REDUCTION
GEAR CAGES ★ TANK COMPENSATING DRIVE SHAFTS ★ TANK
COUNTERSHAFTS ★ TANK FINAL DRIVE SHAFTS ★ TANK INPUT
SHAFTS ★ TANK UNIVERSAL JOINTS ★ TANK SPINDLES ★ GUN
TUBES ★ GUN CARRIAGE PARTS ★ HIGH EXPLOSIVE SHELLS ★
ARMOR PIERCING SHELLS ★ CHEMICAL SHELLS ★

The 3A Duomatic has "gone to the front"—a versatile, fully automatic Lathe—for "all-out" production.



Write for Bulletin 601 on the 3A Duomatic Lathe.

THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO, U. S. A.

ENGINE

TOOL ROOM

AUTOMATIC LATHES

PRODUCTION PERSPECTIVES

LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING

Over-all production: Every report indicates upward trend. Federal Reserve Board says total industrial production moved ahead three percent in August to 183 percent of 1935-39 average. Donald Nelson, reporting that war production jumped eight percent the same month, said: "the performance is not one we can brag about." WPB's accurate index shows production today is more than three-and-one half times that in the pre-Pearl Harbor month. Total value of U. S. munitions output now exceeds \$4,700,000,000 monthly.

What is the Limit? President Roosevelt says we have reached 94-95 percent of efficiency. Industry itself doesn't agree, doesn't know its own limits. Raw materials available (pretty well known), and manpower available (not known), are determining factors. Monthly increase will soon slow down, but won't stop.

Production goals: Monthly quotas are being set at "impossible" figures. WPB policy is to set goals higher than reasonable, hoping to get more production than would be forthcoming if goals were reasonable. This explains August output 14 percent below figure asked.

Leaders of industry dealing with government scoff at reports of Nelson losing power in revised WPB setup, say he's stronger today than at anytime since taking the job.

Machine Tools: 29,100 new machine tool units were shipped in August. Value was \$117,442,000. Rise over July was 800 units, a gain of 3.3 percent. This year's output is estimated at 350,000 units worth \$1,400,000,000, compared with 194,000 units worth \$771,000,000 in 1941. Present rate of increase is 83 percent.

Canadian tools: Once entirely dependent on G. B. and U. S. for machine tools, Canada now exports to both countries, and has increased her machine tool production 800 percent since war began.

Shipbuilding: This field is not mass production, but utilization of that technique set a September all-time record of three vessels launched a day, 93 new ships delivered. Maritime Chairman Land reported to F.D.R. that the record to date indicates "your directive of 16,000,000 deadweight tons appears... certain of accomplishment." Liberty ship construction time has been sliced from 241.8 days in January to 70 days in September. Engineers say prefabrication of parts for Kaiser's 10-day ship required 30 to 40 days.

Manpower: Some engineers believe shortage can better be solved by stimulating those now on job than by adding more workers. WPB labor-management committees (1,500 in operation) have worked better than expected. In some cases only a small increase resulted, but the War Department announced a 198 percent rise in output at the Cooper Bessemer Corporation.

October witnessed more women at work on machine tools, proves they can fill many jobs previously "reserved" for men. Ammunition industry is the largest woman employer in U.S. war production. Survey of 10 plants shows women occupying two-thirds or more of jobs.

Aviation: A number of concerns are building Army gliders on mass production. One auto manufacturer already has ships in the air. Transport gliders can carry four times the cargo weight of planes.

After war production: Aircraft companies plan to invade other fields. One West Coast plane builder already has detailed plans to produce automobiles and washing machines.

Trends

While industry has been pushing production to the highest point in the history of the machine age, the press and radio serve as a sounding board for the conflicting opinions of governmental leaders on how well the job is being done.

President Roosevelt, back from a 8,754-mile inspection trip, announced that in some spots there are occasional shortages of material, but estimated the production total around 94 to 95 per cent of the objectives he set.

As F. D. R. circled the country, automobiling through huge factories and shipyards on a "secret" inspection trip, military and government production chiefs were telling the country that we can lose the war if we don't keep our shoulders to the wheel.

Though these men had done straight talking, cited facts and figures, the President said he wouldn't have made such remarks.

The same day a tougher Donald Nelson reported munitions output in August rose eight per cent over July, said "the performance is not one to brag about."

Roosevelt said he was impressed by the number of women workers in war plants: 20 to 30 per cent, mostly highly skilled labor. In a year, half the labor in war plants will be women, he predicted.

Ford announced 28 per cent of Willow Run workers are women; and the Manpower Commission says 5,000,000 more women must be added to war production payrolls by the end of 1943. Definite War Department announcement of an Army of 7,500,000 was the greatest help the WPB has yet received in manpower and production planning.

Civilian Production

What is happening to the industries that once produced the goods sold in 300,000 stores expected to close by the end of next year? They, too, are closing at a rapid rate. Chances of them getting war contracts are slim.

Buried deep in news from General Headquarters are two reasons. First: there are enough raw materials to keep the small shops going. Second: Army-Navy preference for giving prime war contracts to large, mass-production firms.

Every suggested solution to the small plant dilemma seems questionable. Business "pools" such as worked out at York, Pa., rarely have been practical. The government's Smaller Plants Corp., after three months of organizing, has been instrumental in letting only \$7,000,000 in contracts. Even in full swing, doubt exists that this organization can meet more than a small part of the small manufacturers needs.

(Continued on page 122)

"GREENIE"

T.M. REG. U.S. PAT. OFF.

Manpower Problems



Be sure to segregate your alloy scrap



Careful segregation and identification of alloy iron and steel scrap should be standard procedure in every plant collection program.

1. It helps conserve essential, scarce alloying elements.
2. It helps eliminate wasted time, material and effort in the steel mills.

Alloying elements such as cobalt, molybdenum, nickel and tungsten are readily recoverable from scrap. If their presence in a lot is known, the scrap can be used in making up a charge of alloy steel of

the same or similar analysis. The amount of alloying elements that must be taken from stock is reduced.

But, if, through lack of segregation, alloy scrap gets into a charge where no alloys are wanted, such as a plain carbon steel, the alloying elements are utterly wasted. It is also possible that the heat itself will be lost because of failure to meet specifications.

The difficulties of scrap segregation increase with every handling. The source is the best point for segregation. Comparatively little time and trouble taken there will save a great deal of trouble and wasted time at the mill.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Mo-lyb-denum Company
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CONTROLLED
Hydraulic
POWER

with **RACINE**
Variable Volume Pumps



Controlled Power means smooth efficient operating pressures from 0 to 1000 pounds per square inch at your finger tips. No relief valves and by pass valves are needed to control volume as only the oil actually used by the hydraulic system is pumped. RACINE Variable Volume Pumps reduce horsepower consumption in hydraulic press work, die casting, and metal working. They cut costs and improve performance of materials handling and road working equipment, mining machines, and oil operated equipment of all sorts.

RACINE Variable Volume Pumps are made in three sizes, 12, 20 and 30 gal. per minute, and for operating pressures from 0 to 1000 pounds per square inch. Pressure chamber ring is a hardened steel true circular race that imparts a smooth harmonic action to the vanes. This action gives a continuous powerful non-pulsating flow of oil. Slanted vane slots in the husky rotor make the vanes polishers . . . no gougers of pressure chamber ring . . . greatly increasing pump life. RACINE Pumps are soundly engineered and efficient sources of hydraulic power.

WRITE TODAY FOR DETAILED INFORMATION.
OUR ENGINEERS WILL BE GLAD TO WORK
WITH YOU WITHOUT OBLIGATION.

RACINE TOOL AND MACHINE COMPANY
1777 STATE ST., RACINE, WISCONSIN

—PRODUCTION PERSPECTIVES—

(Continued from page 120)

Tools

"The need for still greater production remains acute and immediate," George H. Johnson, past-head of the National Machine Tool Builders Association and president of the Gisholt Machine Tool Company, told the industry's leaders at their annual meeting last month. "As all of you know, the industry has a backlog of over a billion dollars — representing on the average, eight months on a full production basis."

John S. Chafee, head of Brown & Sharpe Mfg. Co., and the new President of the Association, is offering member machine tool companies two trophies for greatest fourth quarter increase in output. One award is based upon percentage of increase over the third quarter in units shipped, the other upon percentage of increase in dollar value.

The WPB has suggested that many machines, tools and dies, laid away in grease and storage sheds awaiting war's end, be dismantled and thrown into the nation's scrap pile. Such a move might mean a booming after-war machine tool industry.

The tough words came from a shy, philanthropic man, Lessing Rosenwald, Chief of WPB's Industrial Conservation Division. Said Rosenwald, "If a machine hasn't been used for the last three months and no one can prove it can be used in the next three, find a use for it or scrap it."

Nelson backed up this statement, said every machine must be used for war production, used for replacement parts for machines on such production, or for scrap.

It looked like another way of cracking down on non-essential civilian production. Such a policy would mean that non-war manufacturers — even those not using critical materials or machines needed elsewhere in war production — are about to lose their means of production.

Detroit soon let the country know what such wholesale destruction would mean in the motor capital. There, industry estimated that scrapping 1942 model equipment would mean a wait of nine to 13 months after war before a new passenger car could be turned out.

It would mean nine jobless months for 2,000,000 odd people who normally supply, produce, repair and sell automobiles. Question they posed was who will stand the loss of a \$4,000 machine melted down for \$40 worth of scrap?

Techniques

Newest of major trades in mass production industry is welding. There were 75,000 welders employed in the U. S. in 1939. Today, that figure has swelled to an estimated 280,000. Their growing prominence in war production is indicated by the fact that last year they consumed 450,000,000 pounds of welding rod, a 2,800 per cent increase in 10 years.

Thanks to the welder's blue arc, today's Liberty ship is

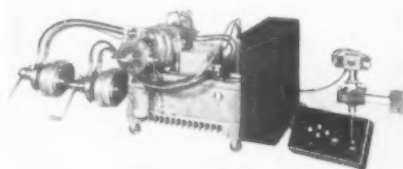
(Continued on page 124)

How to Get MASS PRODUCTION from TOOL ROOM TOOLS

High Speed Production at
Tool Room Limits Without
Specially Built Machinery

Many of the nation's foremost manufacturers have been faced with the novel necessity of producing ordnance on a combination precision-mass production basis with tool room tools. Limits of accuracy previously never expected outside the tool room have been required. This, together with the necessity of using relatively unskilled help, presented an almost impossible problem.

To make ordinary tool room machine tools and "green" help



The "DUAL" DUPLIMATIC, entirely self-contained, puts almost any machine tool on a mass production at-tool-room-limits basis.

"do the impossible", however, has become an accomplished fact.

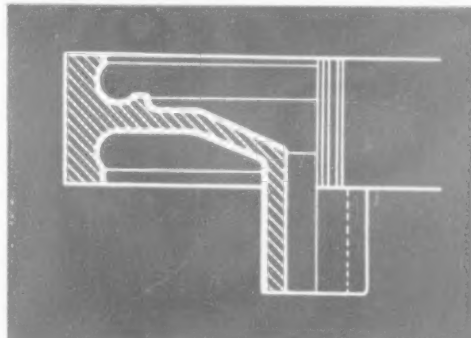
Separate machine tool controls have placed many of the operations on a full automatic basis; the most skilled of their operators have been released for work of greater importance. The elimination of the necessity for increased floor space and excessive long waiting for specially built equipment has been entirely obviated. These machine tool controls, DUPLIMATICS, manufactured by the Detroit Universal Duplicator Company, are now being used throughout the country on war goods production exclusively. The type of work that can be handled is described as follows.

AUTOMATIC CONTOUR TURNING

This sketch shows a thin section propeller gear housing which was of too intricate contour to be machined by manual operation, too thin to be done with forming tools. Also, too few a number were re-

quired too fast to permit the designing and building of equipment for this one operation alone.

A "DUAL" DUPLIMATIC was connected with the cross and longitudinal feeds of a standard Reed-Prentice lathe. Both feed screws are turned automatically and simultaneously as required to feed the cutting tool in and out.



The work is chucked in the usual manner. A template of the exact size and outline of the finished work is fastened to the cross feed carriage. A tracer, clamped to the lathe bed, is adjusted so that its stylus can contact the template. The moment the operator starts the lathe and touches the starting button on the control panel of the DUPLIMATIC, the latter "takes over" entirely on a full automatic basis—moving the cutting tool automatically along the exact path of the finished work.

Since the operation is entirely automatic and since the feed on both screws is simultaneous and graduated in extremely fine increments, blending of radii is certain and even the straight portions of the work is of such fine finish that very little hand-finishing is required. DUPLIMATICS have shown an increase of 7 times the production possible with manual control. Moreover, a decided decrease in hand-finishing and scrapped parts has resulted.

AUTOMATIC CONTOUR MILLING

Milling the contour of aircraft connecting rod cavities is now being done on standard vertical milling machines. In this instance, there was no waiting for special equipment, nor any special training required for the operators of the machines. This operation, while requiring the close-finish of tool room die sinking work, has to be done

at speeds impossible with manual operation alone.

The "DUAL" DUPLIMATIC, identical with that used for the contour turning mentioned above, turns the longitudinal and cross feed of the milling machine table. (If the depth of cut also had a contour or variation, a "THREE WAY" DUPLIMATIC instead of the "DUAL" DUPLIMATIC would have been required.) A template is mounted on the table alongside so that it can be contacted by the stylus of the tracer.

This operation is also automatic, excepting that the operator is required to touch one of four "change-of-direction" buttons on a handy control panel when the milling operation is negotiating a corner of the work. Exceptional blending of radii has resulted in reduction of hand-finishing as compared with that required before the "DUAL" DUPLIMATICS were installed.

The DUPLIMATIC equipment used in this work is an entirely separate control mechanism which can be used with almost any machine tool. The advantages of the use of DUPLIMATICS are that no specially built equipment is needed; tool room tools can continue to hold the accuracies for which they were originally designed.

Specially trained operators are not needed. Usually the same operator, with a few hours' instruction, carries on. In some instances, relatively unskilled operators have replaced the old operators—the latter being released to do work requiring their particular skills.

The installation of DUPLIMATIC on a machine tool does not limit that machine to automatic duplicating only. The DUPLIMATIC can be quickly "de-clutched" from the feeds to permit manual operation.



DUPLIMATIC machine tool controls are used in some of the largest mass production shops in America, producing: TORPEDOES—BOMBS—MACHINE GUNS—AIRPLANE ENGINE PARTS—TANK TURRETS—ANTI-AIRCRAFT GUNS—AIRPLANE LANDING WHEELS.

Ask for complete information NOW.

**DETROIT UNIVERSAL
DUPLICATOR CO.**
731 E. Milwaukee Ave.
Detroit, Michigan



SHIRT-SLEEVE *Trouble Shooters!*



We're up to our necks in trouble these days—that is, other companies' troubles! We've made *their* war production problems *our* problems, and are helping to solve them with a speed and efficiency born of long experience.

Sometimes this involves designing special jigs, fixtures, dies or machinery—sometimes rearranging and revamping plant layout and routing.

But whatever the requirements, skilled McKinney men—engineers, designers and tool makers—team their abilities and experience to effect maximum production in record time.

Our recently expanded facilities and increased personnel now enable us to offer this helpful engineering service to more companies. May we quote on your requirements?

DEPEND UPON MCKINNEY FOR:

- ★ Design and manufacture of dies, jigs, fixtures
- ★ Plant Layout and Routing
- ★ Process Engineering
- ★ Product Engineering
- ★ Tool Designing
- ★ Machine Designing

MCKINNEY

TOOL & MANUFACTURING CO.

1688 ARABELLA RD.

CLEVELAND, OHIO

"DESIGN ENGINEERS



FOR TWENTY YEARS"

—PRODUCTION PERSPECTIVES—

(Continued from page 122)

ready for launching in one-third the time it took to drive 500,000 rivets into the same size vessels a few years ago. Welded ships have 13 per cent less deadweight, correspondingly higher cargo capacity.

Wherever welding has been applied in war production, it has resulted in savings of 10 to 40 per cent in man-hours and raw materials. Skilled welders can deposit up to 12 inches of metal a minute, equivalent to the output of a four-man riveting team. Welding machines, adopted to production-line jobs, double this figure.

Exchange of techniques is the reason for the newly-organized Aircraft War Production Council, Inc., East Coast. Taking a cue from their Western cousins, leading Eastern manufacturers are pooling their resources: facilities, methods, materials, even key personnel.

Wright Aeronautical is now subjecting their radial aircraft engines to "polar" tests. Engines, inches deep with ice, are run in huge iceboxes at 50 to 60 degrees below zero to determine effect on fuel, oil and batteries. Results are forwarded to winter quarters of United Nations airmen.

Blind workers, long used in several auto factories, are now at work in aircraft industry. Lockheed reports them better in some respects to those with sight. Typical work: taping off sections of planes for painters, burring-roll work, detail and tubing assembly.

Materials

Apparent Capital inclination is to soft pedal news of material shortages. The fact bobs up nonetheless in news that more shipbuilding contract cancellations can be expected. Shortages: steel, brass, copper, rubber and nickel.

"Purp," the WPB's Production Requirements Plan, is headed for the graveyard. Trouble was the immensity of task of allotting materials to any concern using more than \$5,000 worth of given metal a quarter. The Nelson-sponsored plan was a good try at making requirements meet available materials.

Due about the first of the year is a revision in the "Purp" plan which will put the stress on goods to be produced rather than on raw materials the manufacturer thinks he wants.

With requirements for alloy steels this year estimated at double 1940 consumption, a broad-scale program is under way to assure adequate supplies. A major step undertaken has been the development of the N. E. alloys. Seventeen producers have been given permission to ship experimental amounts of the emergency metals to laboratories or manufacturers during the fourth quarter.

Other moves have been made to solve the problem. Next year U. S. chromium production may be 250 times as large as the 1940 output. Other metal supplies are increasing.

(Continued on page 126)



★ *Woodworth employs a nearly equal number of men and women. By Mid-Winter, personnel records will show 80% women and 20% men.*

TO N. A. WOODWORTH MEN AND WOMEN FOR *"Outstanding War Work"*

Men and women of N. A. Woodworth Company have received the only military decoration given to civilians, the Army-Navy "E" Award. ★ ★ ★ This signal honor has been accepted with sober consideration of the greater responsibilities it demands. Having publicly acknowledged our production accomplishments, the Army and Navy expect us to maintain and even surpass past efforts as America's Armed Forces step-up the military pace against Axis aggression.

★ ★ ★ Mighty bombers, deadly fighter planes are impotent if integral engine parts fail to stand the stress of combat flying. In manufacturing over 100 highly precisioned engine parts, Woodworth employees keenly feel their responsibility in this country's war effort. ★ ★ ★ Management and labor are pledged and anxious to meet any new production goals and mechanical requirements set forth by the Army and Navy to always be worthy of the "E" Award.

N. A. WOODWORTH COMPANY

AIRCRAFT ENGINE PARTS • PRECISION TAPS • HEAT TREATING, PLATING • PRECISION GAGES
FERNDALE, MICHIGAN

(Continued from page 124)

Air bubbles spun into cellophane may replace scarce kapok. The new Du Pont product, called "Bubblfil," has numerous mass production uses: seamen's life jackets, bridge pontoons, aviation tow targets, padding in tanks and airplanes, insulation in flying suits and sleeping bags.

Everybody gets awards in the war effort. Latest is the Scrap Producers Emblem, presented by the WPB in

September to 138 scrap dealers and 756 automobile graveyard operators for turning in one third more metal than they averaged the first six months. Some 4,600 dealers participated.

Manpower

Canada, where only one worker out of every 60 is a woman, is facing manpower shortage problems. The Dominion has started a "progressive planned pruning" to eliminate all production not essential to a minimum standard

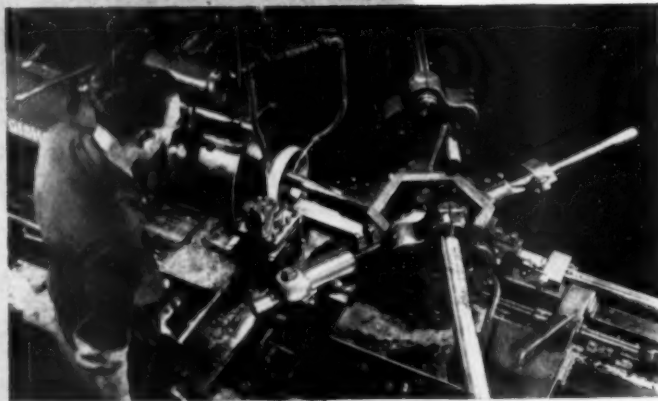
MANPOWER!

● Government manpower experts, searching for solutions to labor troubles as well as more workers to carry on the battle of production, might well look for a few men like Gus Selberg of Vancouver. Last word received was that Gus, 54-year old potman at the Aluminum Co., of America's plant there, having completed seven consecutive sixteen hour shifts in one week, had started another.

His 112 hours of work in seven days produced enough metal to build nine fighter planes!

Here's the reason. "I have a son with the navy somewhere in the Pacific," Gus explained.

YOUR MACHINE IS *Down Less*



when you use KENNAMETAL*

KENNAMETAL has many characteristics and capabilities which minimize down time and increase the units produced per hour from machines already in your shop.

Because of its low thermal conductivity KENNAMETAL'S resistance to cratering decreases tool wear. Its hardness, transverse rupture strength, and greater modulus of elasticity (58,000,000 lbs./sq. in.) permit KENNAMETAL to take jump cuts at profitable speeds.

KENNAMETAL'S hardness permits it to machine steels heat-treated up to 550 Brinell hardness and therefore often eliminates annealing, re-hardening, straightening, and grinding operations on these hardened metals.

For your boring, turning, and facing jobs use KENNAMETAL tools to get the most production from your present equipment.

For further details, write for your copy of the new McKenna Metals Company Catalog 43.

*Invented and Manufactured in U.S.A.



STYLE 1



STYLE 3



of living. Worst shortages are in base metal industries, defense projects in vital coastal areas.

So-called wage discrimination against workers because of sex appears to be out the window. The War Labor Board has adopted a policy of granting "equal pay for equal work" for women in armament industries. The decision was handed down in a dispute involving 7,600 employees of an Eastern tool concern. The company, it is reported, was willing to reduce the differential in wage rates to 20 per cent.

Paradox in Detroit is the shortage of labor though long lines stand at employment gates. Answer: Shortage is in skilled and semi-skilled workers. Lines are made up almost entirely of unskilled men from farms and southern states.

War is effecting startling changes in higher education. Emphasis is being placed on industrial arts and production, studies that will fit into the war program. Many schools are offering additional courses in production management; several offer studies in priorities. The trend must go much further to solve manpower shortages.

Women the weaker sex? No, says Consolidated Aircraft's chief surgeon. Women invariably outlast men, produce more on jobs not requiring brawn, his tests indicate. "Women are less prone to suffer emotionally, and are not so inclined as men to get the 'jitters' on production jobs he says.

THE END.

THE TOOL ENGINEER

Speed Up GUN BARREL INSPECTION

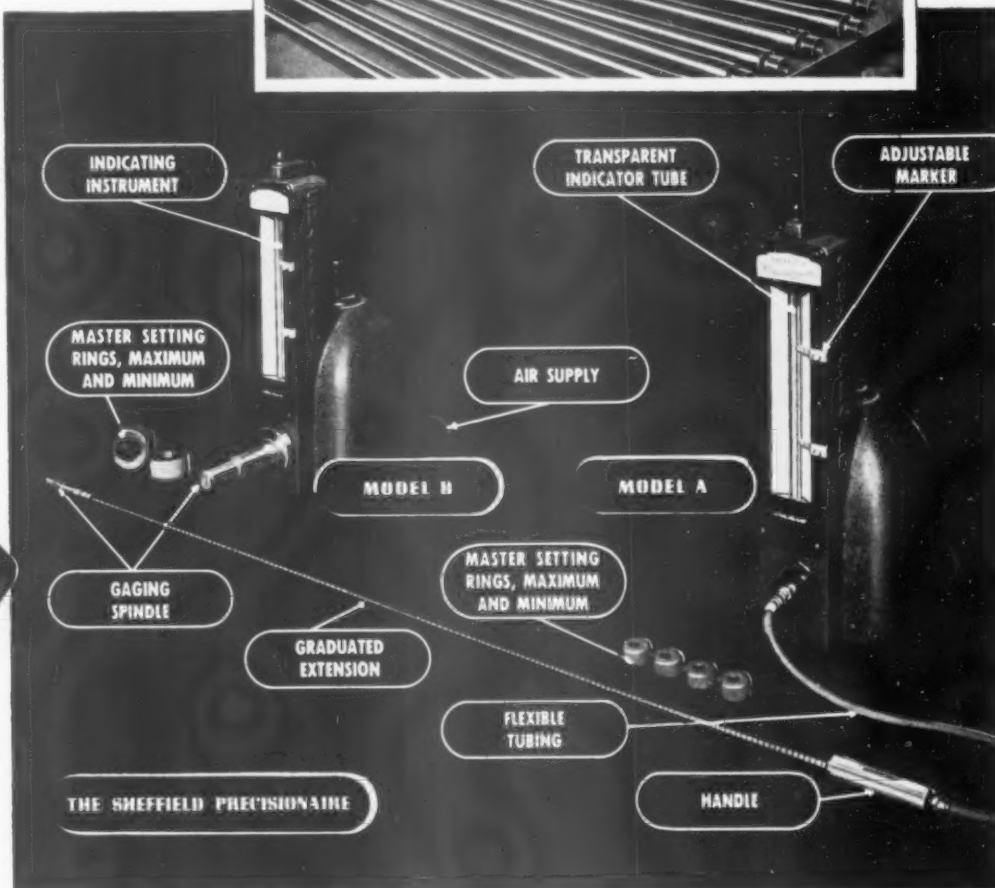
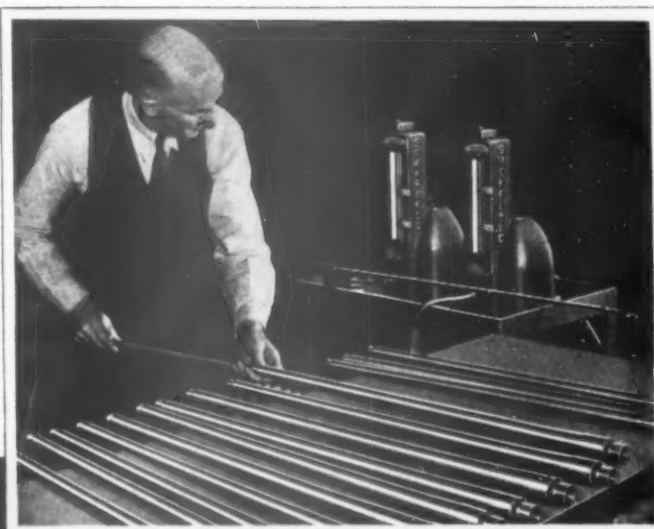
In just one pass through a gun barrel the Sheffield Precisionaire tells the inspector whether or not the bore is within prescribed tolerance or, if not, whether it is oversize, undersize, out-of-round, or bell mouth—also exactly at what point any dimensional discrepancy occurs.

It takes no longer to inspect a gun barrel than it does to push a cleaning rod through it and no more skill, in spite of the fact that the Precisionaire is accurate to .0001". Any new operator having no previous experience can be taught to handle this gage in less than fifteen minutes.

Contrast this speed and this accuracy with inspection by previous methods which were not only slow but which required the highest order of gaging skill in order to maintain accuracy.

The same instrument provided with two slightly different gaging spindles is used to check the bore before rifling and then, by changing the spindle, give it a final inspection after it is rifled.

The Precisionaire, while it is being used extensively for gun barrel inspection, has a number of other very important uses all described in bulletin 42-23. Write for your copy now.



THE SHEFFIELD

CORPORATION

DAYTON, OHIO, U. S. A.





Cemented-Carbide Tipped

INSERTED BLADE MILLING CUTTERS

Produced EXACTLY to Required Specifications

Illustrated is one of a number of inserted blade milling cutters being produced by Carbide Fabricators for one of the leading armament plants. It is typical of many now in production use throughout the country.

Cutters similar to this can be turned out exactly to your specification by Carbide Fabricators. Outside diameters may be up to ten inches. Your inquiries regarding prices of tools manufactured to meet your needs will be given prompt attention. It is important that blueprints accompany each inquiry.

Manufactured in a New Plant Devoted Exclusively to Cemented-Carbide Work

Every machine in the new, spacious Carbide Fabricators plant is used for the production of cemented-carbide tipped tools. The company personnel—working both day and night—is thoroughly experienced in this specialized work, your assurance of receiving the type of tools that can be depended upon to do your job.



Carbide Fabricators Co.

ROYAL OAK
MICHIGAN

MFRS. OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

PUMP PARTS PRECISION BORED IN 25 SECONDS

SIMPLEX PRECISION BORING MACHINE MAINTAINS ACCURACY AND FINISH

This prominent mid-western manufacturer, when switching from non-essential production to a wartime job, installed Simplex Unit-type Precision Boring Machines for all boring operations requiring a high degree of finish and accuracy.

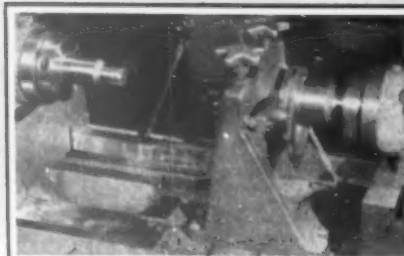
This two-way or duplex-type machine is used to bore from both sides of the pump housing simultaneously. Diameters are held to $\pm .0005''$, insuring precision fits to bearings and oil seals.

**SPECIAL PRECISION BORING MACHINES
WITH GENERAL PURPOSE VERSATILITY**
Simplex Precision Boring Machines are

designed with adjustable units so that either short-run precision boring or production boring can be accomplished. Spindles are adjustable, and the machines can be provided with one or more spindles as desired. Over 25 different basic models of Simplex Precision Boring Machines have been designed to meet practically any type of precision boring problem.

Our engineers will be glad to make a study of your parts and production for faster and better precision boring.

Send part prints and production figures . . . no obligation.



PRECISION BORING DATA

PART—Pump Housing.

MATERIAL—Cast Iron.

HOLDING METHOD—Special Holding Fixture.

MACHINE—#2U 2-Way Simplex Precision Boring Machine.

OPERATIONS—Precision Bore Boring and Oil Seal Fits and Chamfer One Bore.

TOLERANCES— $\pm .0005''$ Dia.
— $\pm .005''$ Depth.

FEED— $1\frac{1}{8}''$ per Minute.

SPEED—1150 r.p.m.

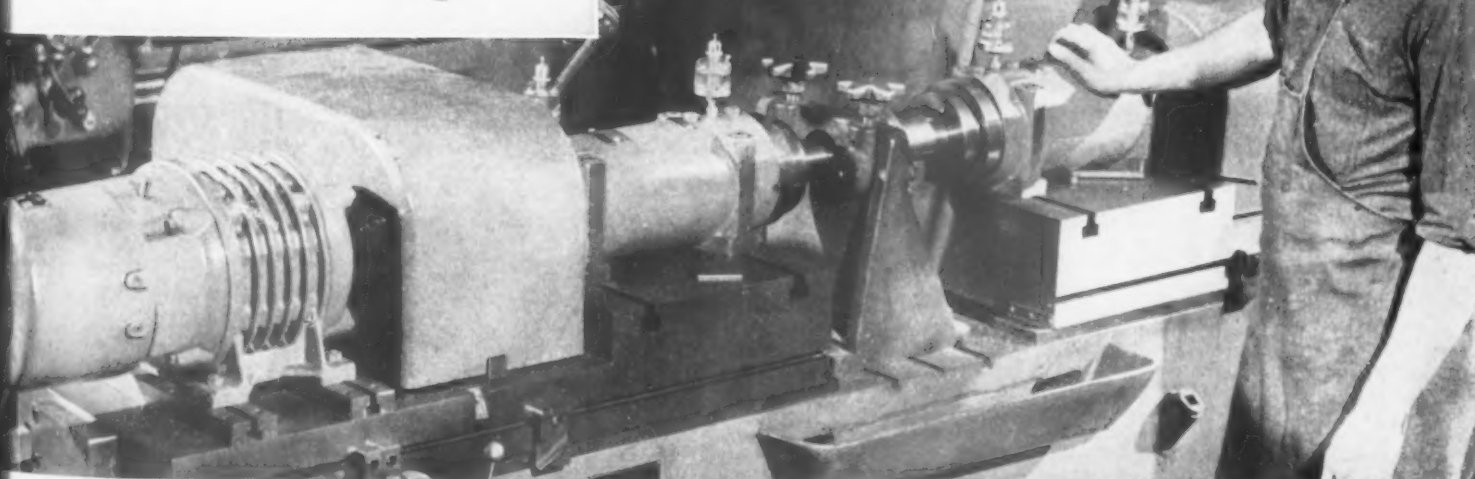
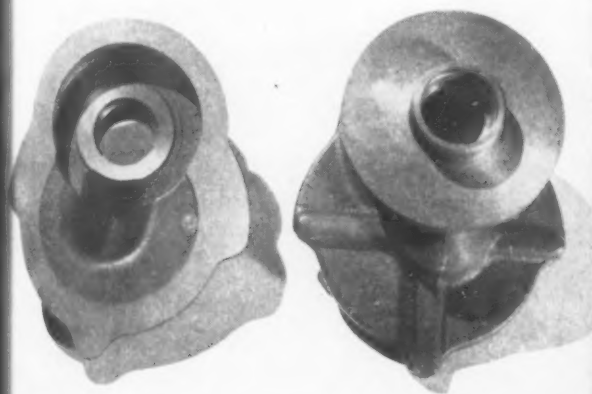
FLOOR-TO-FLOOR TIME—8 Minutes, including inspection.

FREE DATA

Write for these two booklets covering our complete line of precision boring machines. Complete specifications of each type are included. Ask for Precision Boring Machine booklets.



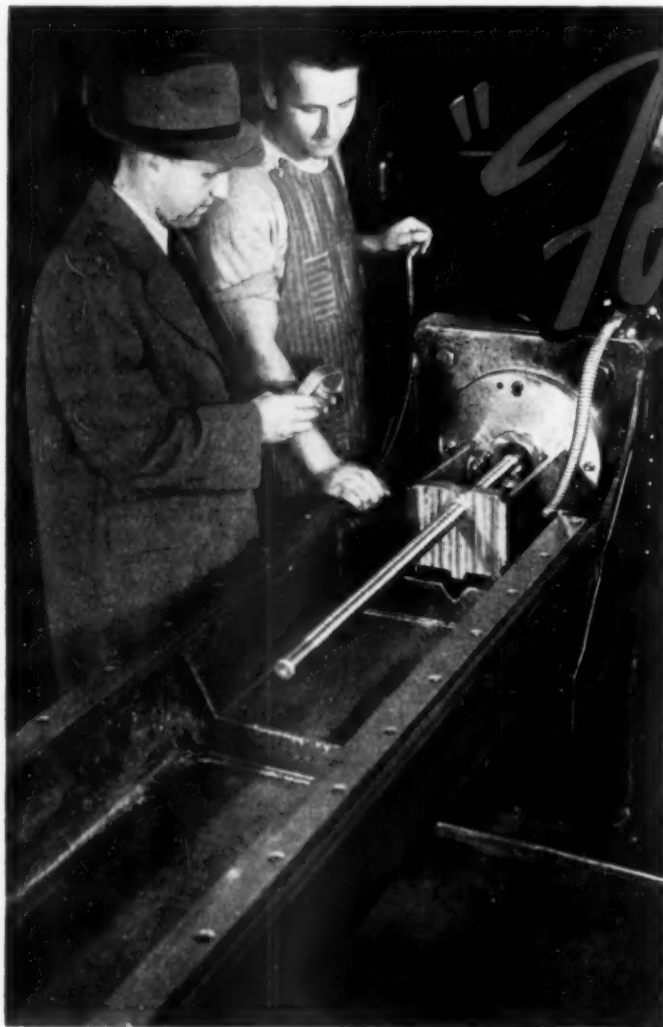
PRECISION BORING FROM TWO SIDES SIMULTANEOUSLY



STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES
4528 WEST MITCHELL STREET • MILWAUKEE, WISCONSIN

DETROIT BROACH



"Follow them"

ASSURES BETTER PRODUCTION IN BROACHING OPERATIONS

Detroit Broaches must produce! They are designed and manufactured with only that in mind.

However, as in any other production operation, there are times when unforeseen difficulties arise on the job . . . problems that cannot be fully solved by the

machine operator or the production executives in his plant. In such cases, a Detroit Broach engineer is immediately available to eliminate whatever trouble has been encountered and to get the job running smoothly. As a broaching "specialist", he knows exactly how the broaches and broaching accessories should function . . . what requirements are necessary prior to broaching . . . how maximum production rates can be secured.

The responsibilities of the Detroit Broach organization end only when the broaches and fixtures produced by the company have done the job for which they were intended.

DETROIT BROACH COMPANY
20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

Planers

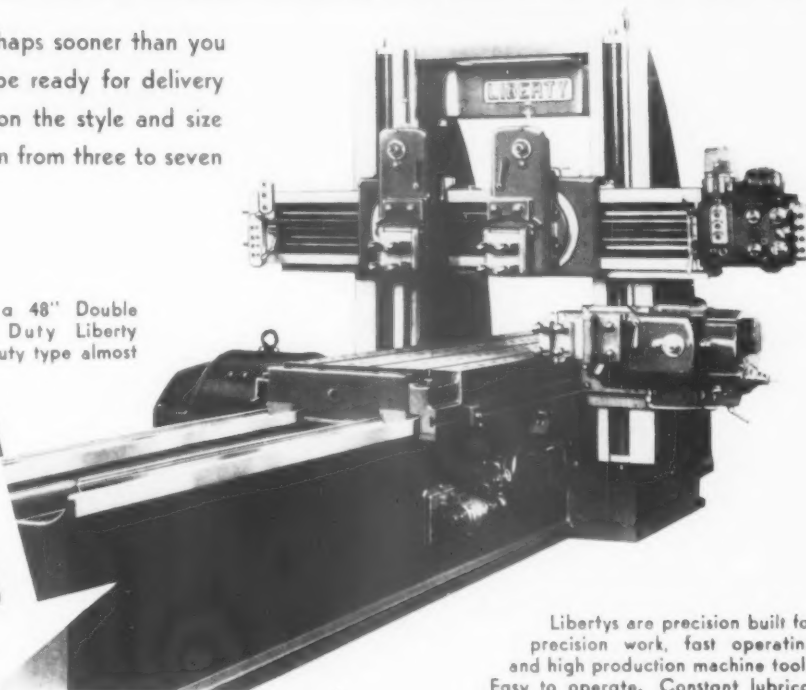
**OPEN SIDE
DOUBLE HOUSING
HEAVY DESIGN**

Ready soon

You can get a new Liberty Planer! Perhaps sooner than you expected! We have a few which will be ready for delivery in the very near future. Dependent upon the style and size you need, your planer can be delivered in from three to seven months!

Illustration shows a 48" Double Housing Heavy Duty Liberty Planer. Medium Duty type almost similar.

**QUICK
DELIVERIES**



Libertys are precision built for precision work, fast operating and high production machine tools. Easy to operate. Constant lubrication. Hundreds of shops now operating under war schedules are attaining maximum results with Liberty Planers.

Delivery — three to four months

48" x 48" Double Housing Medium Duty Planers with 12, 16 or 20' tables.

Delivery — six to seven months

72" x 72" x 20' Double Housing Heavy Duty Planers.

Delivery — five to six months

42" x 42" x 12' Open Side Heavy Duty Planers.

Delivery — three to four months

30" x 30" x 10' Open Side Standard Duty Planers.

Delivery — three to four months

24" x 24" x 8' Open Side Standard Duty Planers.

Consult our nearest representative or factory direct for information and data on planers.

LIBERTY PLANERS

1005 WELLER AVE. - HAMILTON, OHIO

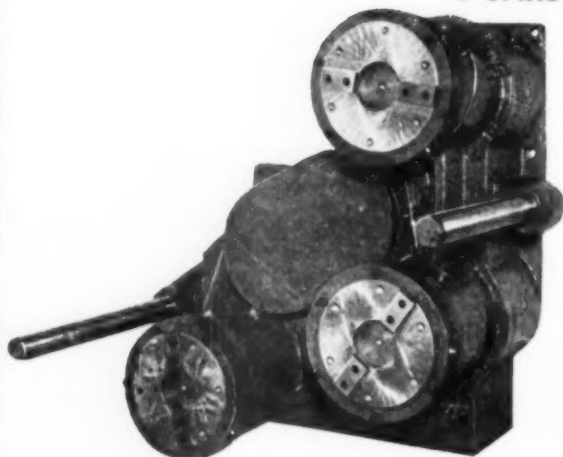
Buhr

MULTIPLE SPINDLE DRILL HEADS

INCREASE YOUR PRODUCTION

TO MEET SCHEDULED DELIVERIES

3-SPINDLE BUHR HORIZONTAL HEAVY DUTY DRILL HEAD



1. Bore, Face and Chamfer.
 2. Hollow Mill.
 3. Groove Outside Diameter.
- Oil pump for positive lubrication.
For finishing one end of large shells.

BUHR MACHINE TOOL CO.

ANN ARBOR

MICHIGAN

*Specialists in Multiple Spindle Drilling,
Boring, Reaming, and Tapping Equipment*

For

PRECISION • STRENGTH

SPECIFY MAC-ITS

Mac-its are heat treated to multiply the strength of every ounce of steel used in them. Designs that take advantage of these stronger screws save man-hours, machine-hours and metals.

THE STRONG CARLISLE & HAMMOND CO., Cleveland, Ohio



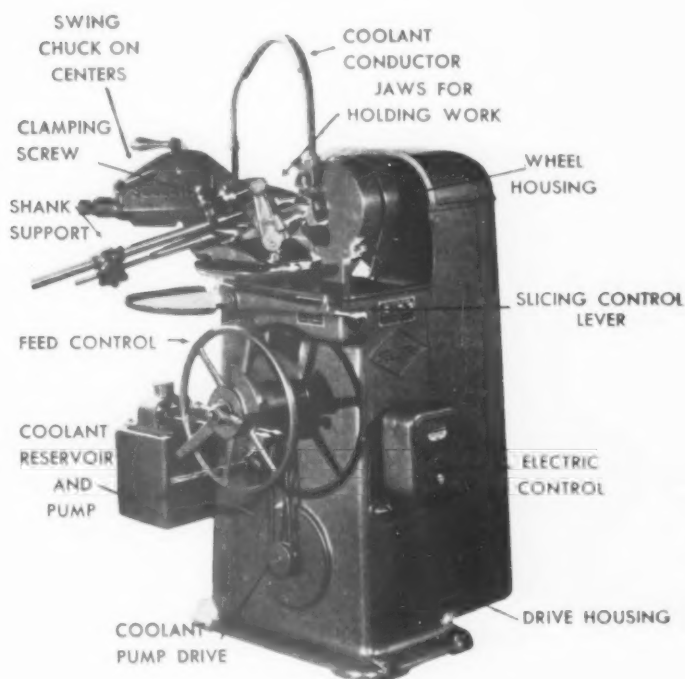
The GIRL and the GRINDER

MARGARET HOPSON
operates a Model 6-G
Sellers Drill Grinder.
Operation and control
levers are so simple and
the automatic location
of the point and the
angle of the cutting lip
so positive that she has
no difficulty in grinding
perfect drills — from the
tiny $\frac{1}{4}$ " size to the big 3"
drills she is working on.

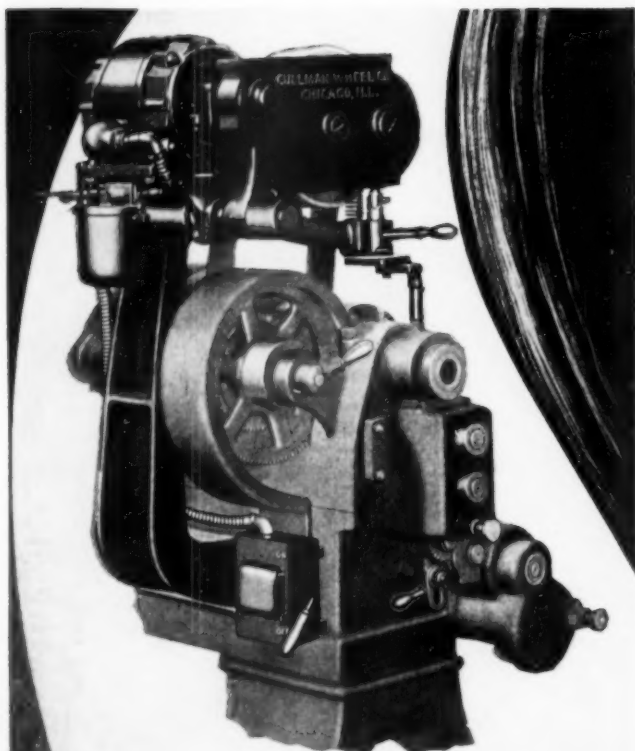
Releasing needed manpower for our 7,500,000
Army (and for all the other Services) Girls in
Industry are rendering a patriotic service that
will not be forgotten. For the production lines
of U. S. industry must not slacken . . . must,
in fact, be speeded up, and at the same time
all possible manpower must go into our armed
forces. Girls in Industry are making this possi-
ble . . . and tools like Sellers Drill Grinders
are helping.

Drills are a vital factor in production, and Drill
grinding therefore is a daily necessity in all
large plants. Fast, accurate drill grinding
insures clean round drilled holes and prevents
production delays. The simplicity of the Sellers
Drill Grinder makes it possible for these girls
to grind the largest as well as the smallest
drills to precision accuracy and with a speed
that is astonishing.

WILLIAM SELLERS & CO., INC., 1600 HAMILTON ST., PHILADELPHIA, PA.



Sellers



**GO ALL-OUT
ON WAR PRODUCTION
with CULLMAN DRIVES**

Add 25% to your output from shaft driven machinery by individualizing lathes, screw machines, shapers, punch presses, milling machines, and similar equipment with CULLMAN Motor Drives.

You can have instant control, belt-drive smoothness, and modernized machine units at a fraction of the cost of new machines.

CULLMAN Drives are available for motors ranging in size from $\frac{1}{4}$ to 15 H. P. Installation is a simple matter---usually requiring only four bolts. Prompt delivery can be made.



CULLMAN WHEEL CO.

1352-R ALTGELD STREET, CHICAGO, ILLINOIS

**Never before has the
RED BAND of Proved Merit
meant so much!**



Another Exclusive Feature of
Abrasive RED-BAND DIAMOND TOOLS

- DRESSING TOOLS
 - BORING TOOLS
- FORMING TOOLS
 - PHONOPOINTS
- LOOSE DIAMONDS
 - GAUGE TOOLS
- SPECIAL DIAMOND TOOLS
TO YOUR SPECIFICATIONS

Write Dept. T, for Catalog and Price List

Immediate Delivery!

Abrasive
DRESSING TOOL CO.
DETROIT, MICHIGAN



Costly Words

**"I CAN BUY
CHEAPER
CARBIDE TOOLS!"**

**It's not PRICE per tool—
but PRODUCTION per tool
that determines cost!**

Why TECO Carbide Tools are Better!

TECO engineers pioneered in the development of tungsten carbides in America, as far back as 1917. Today, these same engineers are putting the results of 25 years research and experience into the manufacture of TECO carbides—producing a carbide most needed for today's exacting requirements.

If all Carbide Tools were alike in quality — it would pay you to buy the lowest price tool.

But they are NOT all alike!

You can specify TECO Carbide Tools—yet save money because you get more production from each tool.

TECO Carbide Tools have proved definitely, on job-for-job comparisons with other carbides, that they operate at higher speeds—hold their cutting edges longer—produce more pieces between grinds—with less down time for re-tooling.

Make your own comparisons with TECO Carbide Tools, in your own shop, to your own satisfaction. Send us details of your operation—let us do the rest.

TUNGSTEN ELECTRIC CORPORATION

570 39th STREET • UNION CITY, NEW JERSEY

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Representative: Architects and Builders Bldg., Indianapolis, Ind.



TECO

Pioneers in Tungsten Carbides
for over a Quarter Century



CARBIDE TOOLS

A Suggestion For Solving
a War Production Problem



ITEM:

USE BARBER-COLMAN UNGROUND THREAD MILLS

GROUND THREAD MILLS ARE BEING
UNNECESSARILY ORDERED IN MANY CASES

Check your specifications! In many cases, such as screw fastenings, bolt ends, and the like, where there is no problem of leakage, or for shells, fuses and bombs, it is unnecessary to order ground thread mills. Manufacturing facilities for ground thread mills are overloaded—capacity for making **UNGROUND** Thread Mills is available. Furthermore, Barber-Colman is now able to offer *Unground* Thread Mills, which, in 75% of manufacture, will produce work within the tolerances of Class III specifications! This is due to recent Barber-Colman research and progress in heat treatment, and is limited to cutters of 1" face or less. If you are in doubt about a particular job, call for our engineering consultation service.



ON THIS JOB, FOR INSTANCE...

Here is a case where Ground Thread Mills were formerly used and have now been replaced with Barber-Colman Unground Thread Mills, still maintaining the tolerances. The piece is a tractor clutch shaft with 12-pitch threads in three places (only one of which is shown). The cutter is run at 220 r.p.m. and production on the 1 1/4" dia. thread shown is 20 pieces per hour average including inspection at the machine. Accuracy on the major diameter and pitch diameter is .002" and accuracy on the lineal pitch is .0005". The cutter is 2 1/4" dia. by 1" face and gives 240 pieces per sharpening.



Thread Milling Cutters of this type are generally designated as **MULTIPLE THREAD MILLS** to distinguish them from similar single type thread mills. Multiple Thread Mills are used for cutting all types of screw threads and offer many advantages both in accuracy and production. For example, the Multiple Thread Mill shown here is used to cut 12-pitch threads of different diameters in three places on these tractor clutch shafts (one end of which is shown).

BARBER-COLMAN COMPANY

General Offices and Plant 213 Loomis Street, Rockford, Illinois, U. S. A.

BARBER
B-C
COLMAN

PRODUCTS

MILLING CUTTERS,
HOBS, HOBBING
MACHINES, HOB
SHARPENING MA-
CHINE, REAMERS,
REAMER SHARP-
ENING MACHINES,
SPECIAL TOOLS



Boston

The Boston Chapter held its regular monthly meeting on the night of October 8th at Schrafft's Restaurant. Ninety-five members attended the fried chicken dinner and several came in later which made a crowd of approximately 100 for the meeting. Chairman Jack Geddes presided. Past chairmen Al Forbes and Cecil Lockwood were present and also Regional

Director John Lindegren from the Worcester Chapter.

Russell Wyman read the names of the new members recently elected to the Boston Chapter which amounted to 25. Next, Mr. Gascoigne of Warner & Swasey Company gave a lecture illustrated by a movie called "Chips".

Following the movie, came the gadget talks. John Hartley of Spray Engineering gave a talk on a gun

spraying machine and Evo Malaguti, vice president of West & Dodge Company of Boston gave a gadget talk on sharpening thread milling cutters.

The speaker of the evening was Mr. A. E. (Handy Andy) Rylander, Master Mechanic at Midland Steel Products Co., Detroit, and A. S. T. E. Editorial chairman. Mr. Rylander talked on tool engineering, economics, World War I and World War II, and at the same time tied these topics in with the doings of the American Society of Tool Engineers.

WIN ARC WELDING AWARDS

The James F. Lincoln Arc Welding Foundation at Cleveland, Ohio, for the past two and one-half years has been carrying on its second industrial study on arc welding, for which 408 awards totaling \$200,000 were recently announced. Results show war industries have only begun to benefit from modern arc welding; that further application of the welding process will slash hundreds of millions of dollars off the United Nations' war bill; will cut by 30 per cent the time required to produce ships and planes; and will save an average of 300 pounds out of every ton of steel going into war production. Among the Tool Engineers who received awards are members of the American Society of Tool Engineers who are pictured below.



Peter F. Rossmann, Chief of Miscellaneous Developments Research, Curtiss-Wright Corporation, Airplane Division, Buffalo, New York. Division of participation—Aircraft, (B1). \$1500.



Daniel D. Eyster, Special Assignment Engineer, Nash Kelvinator Corporation, Seaman Body Plant, Milwaukee, Wisconsin. Division of participation—Automotive, (A 4). \$100.



F. F. Versaw, Shop Superintendent, Gulf Research and Development Company, Pittsburgh, Pennsylvania. Division of participation—Automotive, (A 3). \$250.



A. Lea Keltner, Chief Designer, Boeing Airplane Company, Wichita, Kansas. Division of participation—Functional Machinery, (J 9). \$100.



Van Wyck Hewlett, Sneed and Company, Jersey City, New Jersey. Division of participation—Industry Machinery, (K5). \$100.



John J. Nash, Chief Engineer, American Fixture and Manufacturing Company, St. Louis, Missouri. Division of participation—Maintenance, (L 2). \$100.

(Bridgeport) Fairfield County

The Charter meeting of the Fairfield County Chapter was held on the night of September 15th at the Stratfield Hotel in Bridgeport. The meeting opened at 8:00 P. M. and was presided over by Mr. Adrian L. Potter, Executive Secretary of the Society.

The speakers included Mr. Frank W. Curtis, chief engineer of the Van Norman Machine Tool Company, who gave a talk which was illustrated by moving pictures in color on "Induction Hardening of Machine Parts", a new method of heat treating machine parts.

Another speaker was Mr. H. E. Linsley of the Wright Aeronautical Corporation, who spoke on "Tool Engineering".

At this meeting the following officers were elected to serve for the remainder of this year: chairman: Mr. Thomas Fish, president of the Ready Tool Company, Bridgeport; vice-chairman: Mr. Oscar W. Cooper, Yale & Towne Mfg. Co., Stamford; second vice-chairman: Mr. A. S. Curry, tool supervisor, Nash Engineering Co., South Norwalk; secretary: Mr. Ernest Reaney, Secretary & Chief engineer, The O. K. Tool Co., Inc., Shelton; assistant secretary: Mr. Chester Orciuch, engineer, Automatic Machinery Mfg. Co., Bridgeport; treasurer: Mr. William Brown, research engineer, Andrews Industries, Stamford. Among those present were Mr. Fred Dawless and the executives of the New Haven Chapter. Mr. Dawless inducted the new officers of the Society into office.

(Continued on page 138)

Buffalo

The Buffalo-Niagara Frontier Chapter held its October meeting on the 15th at the Hotel Lafayette, in the Main Ballroom — new meeting place of the Buffalo Chapter. Seated at dinner were 110 members and guests, with over 150 present when the meeting was turned over to the principal speaker.

Mr. A. E. Smith, factory manager of plant 1, Curtiss Airplane Div. and a member of the Buffalo Chapter, was the speaker of the evening. His sub-

ject was "Advancement in Aircraft Tooling". Mr. Smith has been in the aircraft field for 19 years, 14 years of this with Curtiss-Wright.

Mr. Norton W. Ruth, asst. director of National Defense Training, in charge of night sessions in Buffalo schools, was the coffee speaker. His subject was "Training of Women."

Chicago

Chicago's Chapter held its October meeting at Huyler's Restaurant on the night of October 5th.

Chairman Hoefer introduced Mr. Otto W. Winter, the national president of the Society, who spoke on the subject "Experiences in Russia."

Cleveland

The Cleveland Chapter held its second meeting of the current year at the Mid-Day Club on October 9th. It was attended by about 100 members and guests for dinner and upwards of 150 for the technical session.

Following the business session an after dinner discussion was conducted by Dr. Blake Crider of Fenn College Psychology Department on the subject of "Hypnotism."

Immediately following the coffee talk the crowd adjourned to the technical session where Dr. Mario Martellotti, research engineer for the Cincinnati Milling Machine Company, gave a talk on "An Analysis of Up and Down Milling." Martellotti's talk was accompanied by slides and motion pictures on the subject.

Dayton

The Dayton Chapter held its October 12th dinner meeting at the Engineers Club. Following the dinner the members retired to the Auditorium for the business and technical session.

Chairman Howard McMillan turned the meeting over to George Tillotson, program chairman, who then introduced the speaker, Mr. L. E. Mehlohope, of the Cincinnati Milling & Grinding Machines, Inc. Mr. Mehlohope spoke on "Shell Grinding." His talk was illustrated with slides explaining the basic fundamentals of centerless grinding and machines now in use for modern high speed finishing of shells. An exhibit of shells ranging from the small 30 cal. to the 155 mm. attracted many of the members.

Detroit

The October 8th meeting of the Detroit Chapter was held in the Rackham Educational Memorial Building at the invitation of the Engineering Society of Detroit and was attended by 357 dinner guests and an additional 50 at the technical session.

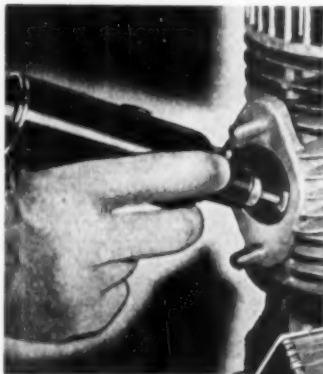
Mr. Brandt of the War Production Board introduced the national president of the Society, O. W. Winter, who addressed the audience on "Women in Industry." His talk revealed a careful and farsighted study of the problems involved in reorganizing our wartime labor supply.

(Continued on page 140)



MOTO-TOOLS

SPEED UP WAR PRODUCTION



Above: Moto-Tool is ideal for getting into close quarters, grinding, buffing and finishing to required specifications. Can be used for metal, wood, plastics, porcelain, glass, and other materials.

Dremel Moto-Tools are speeding up war production in defense plants from coast to coast. These rugged tools tackle grinding, routing, buffing and finishing jobs with speed and precision . . . faster and easier, especially in close quarters . . . in hard-to-get-at places.

A Dremel Moto-Tool has a shock-proof bakelite housing, oil-sealed bearings, and a balanced armature to eliminate vibration and produce finer finished surfaces. It weighs only 13 ounces . . . can be hooked up to any AC or DC outlet. Used in America's leading arsenals of democracy . . . by General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrop Aircraft, Douglas Aircraft, Inc., and many others.



Below: Tool makers find Moto-Tool's sensitive, finger-tip control indispensable when shaping intricate or irregular metal dies. For grinding or cutting with steel accessories . . . it can't be beat for convenience and adaptability.

**27,000 RPM**

The complete Moto-Tool kit has accessories for all types of grinding, buffing and finishing operations . . . with steel cutting tools and the best abrasives. Consists of 1 Model 2 Moto-Tool with 3 collets: 1/8", 3/32", and 1/16", 4 Emery Wheel Points, 1 Dressing Stone, 8 Carving Cutters, 1 Steel Saw, 3 Bristle Brushes, 1 Steel Cleaning Brush, 1 Screw Mandrel with Sanding Discs, and 1 Shoulder Mandrel, one 1/2" Drum Sander. Packed complete in sturdy felt-lined hardwood cabinet case \$23.50. Dremel No. 2 Moto-Tool only \$16.50.



Dremel emery wheel points, steel cutters and accessories with 1/8" shanks are available for quick delivery in a wide variety of sizes and shapes. They can be used with practically all makes of hand grinding tools. Write for catalog.

**10 DAY TRIAL**

Try a Dremel Moto-Tool for 10 days in your own shop. See how versatile, how indispensable it can become to fast, accurate work. Order from your industrial distributor, or contact any of the following representatives:

WEST COAST
THE FEDERATED SALES
CO.
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PRODUCTS CO.
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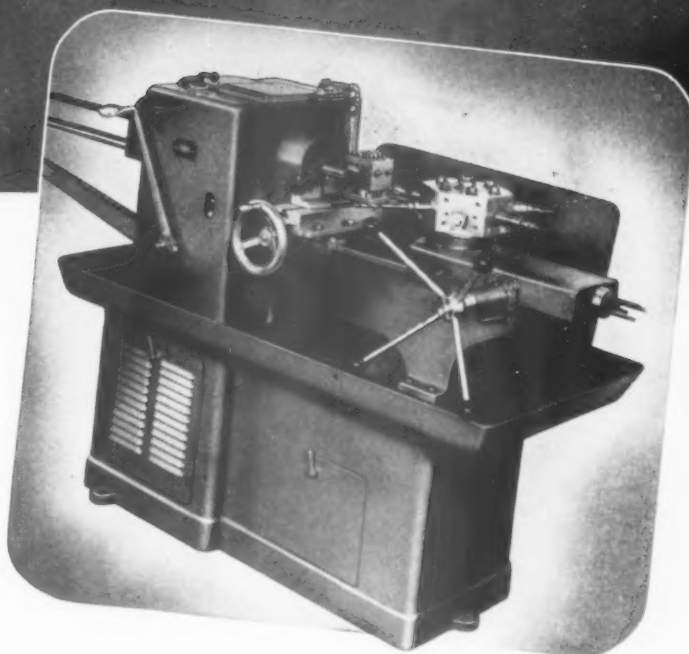
DREMEL MANUFACTURING CO., T442-L, RACINE; WIS.

Beginners learn rapidly on this
Simplified machine



OSTER

NO. 601
"RAPIDUCTION"
Turret Lathe



In double-quick time, you can train new operators on the Oster No. 601 SIMPLIFIED Turret Lathe. This motor driven machine is equipped with manually controlled, 6-position turret, or with plain saddle, as desired.

Another option is the choice of either worm

drive or direct drive. Automatic chuck capacity is 1½" round bar. Swing over bed is 14". Swing over cross slide is 6½".

Complete details in Catalog 27-A. Write, wire, or 'phone for a copy.

THE OSTER MANUFACTURING CO.
2063 East 61 Street • Cleveland, Ohio, U. S. A.

Elmira

The Elmira Chapter held its October meeting on the night of the 5th. Guest speaker of the evening was Mr. William H. Oldacre, president of the D. A. Stuart Oil Company of Chicago. Mr. Oldacre talked on "Increasing Machine Efficiency Through the Intelligent Application of Cutting Fluids." Despite tire and gas restrictions, the turnout for this meeting was said to be very good.

Fond du Lac

The Fond du Lac Chapter held its

October meeting on the night of October 9th in the Crystal Room at the Conway Hotel in Appleton, Wisconsin. 65 members and guests were present. W. E. Rutz of Fond du Lac, presided at the business meeting in the absence of the chairman and vice-chairman.

Mr. Charles R. Staub, chief engineer of the Michigan Tool Company at Detroit, presented a paper entitled "Shaving and Lapping Gears." The talk was supplemented by slides and followed by a question period with members and guests taking part. Such

items as gear cutter forms, materials and applications were discussed.

Hamilton

The October meeting of the Hamilton, Ontario, Chapter was held at the Royal Connaught Hotel in Hamilton on Friday evening, October 9th with Charles A. Fisher, chairman, presiding. 100 members attended the dinner and about 131 attended the meeting and lecture.

Mr. C. Neal, a member of the Toronto Chapter and Manager of the Carboly and Metal Products of the Canadian General Electric Company, spoke on cemented carbide — "The Magic Metal."

Hartford

The Hartford Chapter opened its current season with a dinner and technical meeting held at the City Club in Hartford on Wednesday evening, October 7th. Gasoline rationing and the tire situation held the attendance down to about 100, which is far below average for this Chapter.

The speaker of the evening was Major John A. Van Deventer, president and editor of "The Iron Age." Van Deventer's general topic was "Ways and Means adopted by American War Plants to Increase production on the Second Front."

Houston

170 members and guests were entertained at the Houston Chapter meeting on the night of September 24th.

The speaker of the evening was Philip M. McKenna, whose subject was "How to Design and How to Use Cemented Carbide Tools." The lecture was illustrated with slides.

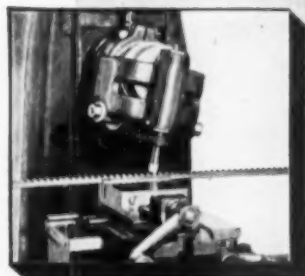
Los Angeles

The Los Angeles Chapter held its regular meeting on the evening of Thursday, October 8th at Scully's Cafe. Included on the program, which followed the dinner, were sound films entitled "Building a Bomber" and "Building a Tank," which was presented by the Office of War Information.

The speaker of the evening was R. R. Nolan, superintendent of tooling for Northrop Aircraft Company, Inc., Hawthorne, California. Mr. Nolan gave an illustrated talk on "Electrolytic Etching in Tooling." A question period followed the talk.

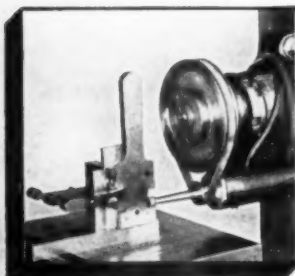
(Continued on page 142)

LIBERTY High Speed Grinding Attachments



Grinding clearance of broach teeth.

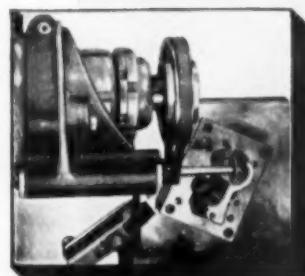
Both horizontal and vertical types are easily attached to most surface grinders for grinding angles, slots, recesses and surfaces which are impossible to reach with large grinding wheels.



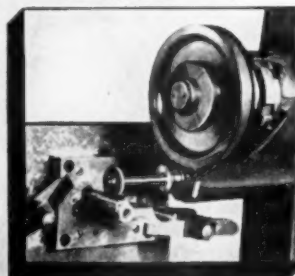
Grinding gage in perfect alignment with other points.

For extremely accurate grinding on gages, tools, dies, etc. Assembled complete with any size bores, pulleys, belts and grinding wheels at no extra cost.

Write for details — specifying diameter of spindle head, type and make of grinder.



Grinding punch form.



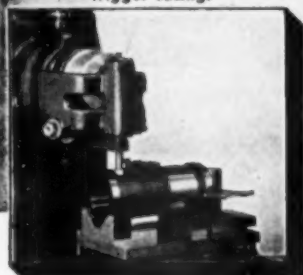
Grinding shoulder on punch.

LIBERTY TOOL & GAGE WORKS

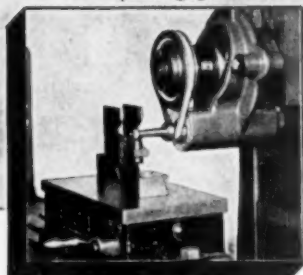
233 Georgia Ave.

Providence, R. I.

Grinding rectangular opening in trigger casing.



Grinding gaging seat on special gage.





ALTHOUGH designed primarily for strut boring and drilling and boring of gun barrels, the W. F. and John Barnes 445 machine is built to handle other jobs within its capacity.

The capacity of this machine is as follows: Stroke — 16', length of part — 15'-8" maximum, steady-rests 5" to 16" diameter, spindle centers — 26", spindle height from ways — 20". Each spindle may be controlled from either of two conveniently located control stations.

Unlike our 410 and 420 Deep Hole Drilling Machines, the tools are fed into the work and the heads remain stationary. The heads are, however, moveable to accommodate various lengths of work-pieces. The spindles, the hydraulically actuated tool slides, and the feed rates of the tools are independent permitting the handling of two dissimilar work-pieces requiring separate feeds and speeds.

Whip supports prevent the springing of the tool shanks at the start of a cycle. These are moved along the ways by the tool slides and are returned to their original positions by cam-operated latches on the tool slides.

WRITE TODAY FOR ILLUSTRATED FOLDER DESCRIBING THE 445 INDEPENDENT TWO-SPINDLE DEEP HOLE DRILLING AND BORING MACHINE.



W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

Milwaukee

The Milwaukee Chapter held its October meeting on the night of the 8th in the Colonial Room at the Republican Hotel. Lawrence J. Radermacher was the acting chairman and introduced Mr. M. Henniger of the Allis-Chalmers Mfg. Co., who was the speaker of the evening. Mr. Henniger spoke on the nineteen basic patents. Slides were used with his lecture. Mr. Schmiegel was the winner of the door prize.

(Moline) Tri-Cities

More than 100 members and guests attended the October dinner meeting of the Tri-Cities Chapter at Watch Tower Inn in Blackhawk State Park.

Mr. Chapman and Mr. Bruce of the Gisholt Machine Company at Madison, Wisconsin presented colored motion pictures, dealing with "Tooling and Operating a Turret Lathe." The film illustrated the fundamental operations of different types of turret lathes and indicated the ad-

vantages of such machines in producing war material.

Montreal

The Montreal Chapter held a well patronized meeting at the Windsor Hotel on the night of October 14th. Mr. Jack Hall presided as chairman and the speaker of the evening was Mr. E. V. Flanders of Jones and Lamson Machine Company. His subject was "Thread Grinding."

(New York-New Jersey) Northern New Jersey

The Hotel Robert Treat was the scene of this Chapter's regular monthly meeting on the night of October 13th. 54 were present for dinner which was followed by the showing of a motion picture entitled "Keep 'em Rolling" by B. F. Goodrich Corporation.

The chairman then introduced the speaker of the evening Mr. T. P. Hubert, manager of the Newark office of the Aluminum Company of America. Mr. Hubert showed three moving pictures made by his concern which were entitled "Machining Aluminum," "Riveting Aluminum," and "Welding Aluminum." Mr. R. Chestnut, superintendent of the Edgewater plant, answered the various questions from the floor after the showing of the movies.

After the regular meeting Mr. Preece opened the question period for the "Trouble Clinic" where several questions were answered by this committee. The first question was on the advisability and the probable use of rolled threads in aircraft manufacturing. This was answered by Mr. Taylor of Wright Aeronautical Corporation. The next question was regarding the tinning of various parts before nitriding so that the section would not be nitrided. This question was answered by Mr. Preece and several others from the floor. The next question concerned die design of large progressive dies having several steps. The construction was talked about after the question was answered by Mr. Masters of the Edison Industries.

Philadelphia

The Philadelphia Chapter held its first meeting of the new season on September 17th at the Engineers Club in Philadelphia.

Guest speaker of the evening, Lt. Harry L. Landauer, Ordnance Department, presented a very interest-

(Continued on page 144)

How to Snap Into War Production!

Let Our Production Engineers Solve Your Problems!

LEADING manufacturers in war production industries are constantly calling on us to aid them in solving production problems on new and unfamiliar types of work—thereby saving valuable time and also lowering production costs.

Our staff of over 150 production engineers, each with specialized training in his own particular field, is at your service. Correspondence invited.

We Specialize In:

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WRITE for quotation on the type of services in which you are interested. No job too large or too small.



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How to pick the Right Size

Standard Finisher for **BIG GEARS**

For heavy duty gears
up to 18 in. there
is the NEW 862-18

Where gears run to 24
in. diameter, the NEW
862-24 does the trick

There is no size limit today on
gears you can finish on "Mich-
igans". If you want to finish still
larger gears by the cross-axis
shaving process, Michigan can
supply you a 'special'.

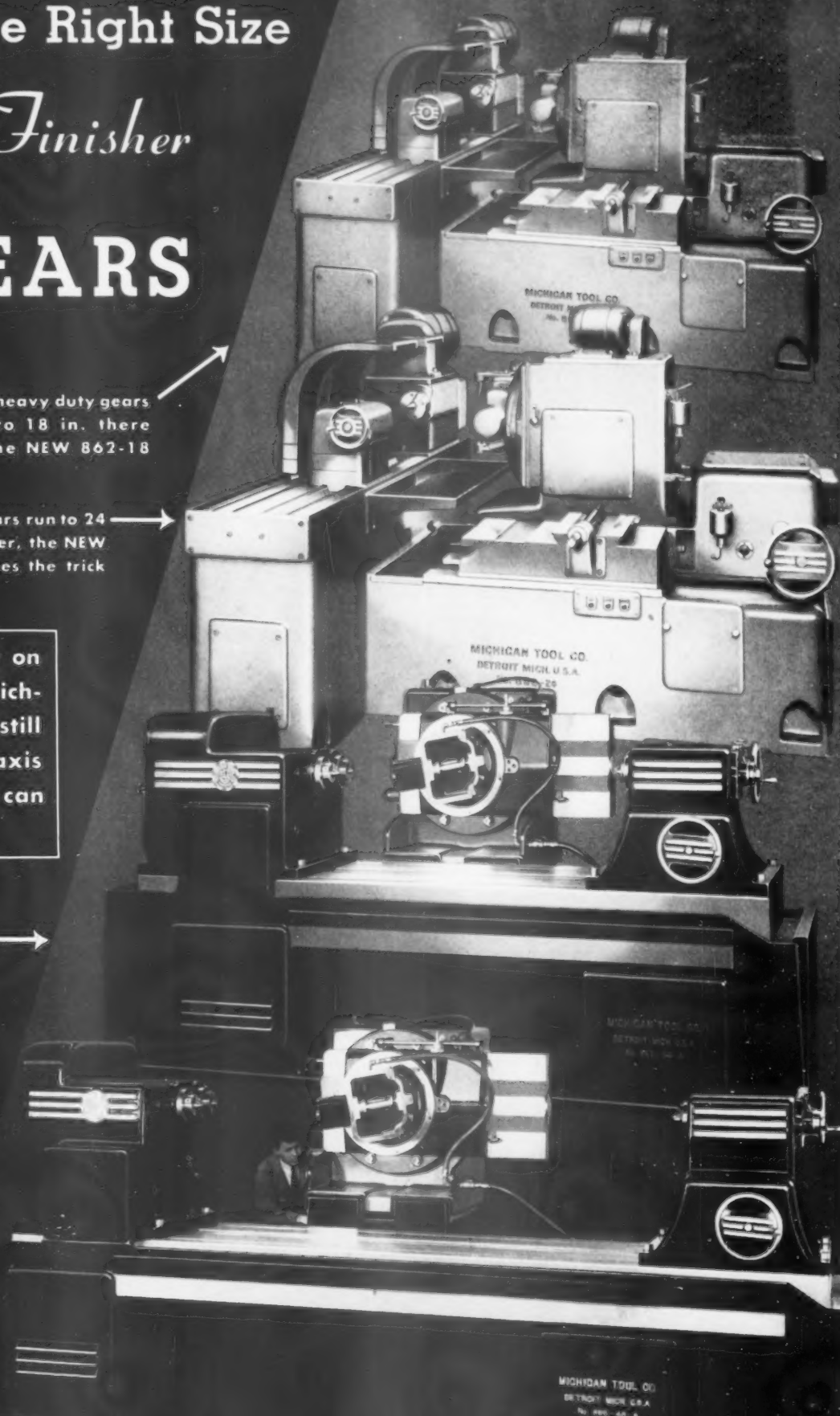
If 3 ft. diam. gears are to
be shaved you should
use the NEW 865-36

And for Gears Up to 4 ft.
diameter there is the
NEW "Michigan" 865-48

The machines shown
here are new addi-
tions. They make even
more complete the
"Michigan" line of
gear production equip-
ment including rack
and rotary shavers,
lappers, checking
equipment and gear
cutting tools.

Pick your ma-
chine and ask
us for a bulle-
tin describing it

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS ROAD
DETROIT, U. S. A.



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ing and instructive talk on "Application and Proper Manufacture of Gages." Another highlight of the evening was the presentation of a handsome loving cup to Adolph E. Berdick's prize winning membership team for their top-notch work last season.

Pittsburgh

The October meeting of the Pittsburgh Chapter was held on the third at McCann's Restaurant in Pittsburgh.

Preceding the scheduled evening talk the Chapter was addressed by Mr. John E. Hamilton of the Machine Tool Division of the War Production Board. Mr. Hamilton spoke concerning the increasing difficulty that is being experienced in obtaining the necessary cutting tools wherewith to equip the great numbers of lathes, millers and other metal working machines that are being manufactured.

Another speaker was Mr. C. J. Hobart of the Pittsburgh Army Ord-

nance District, Labor Supply Unit, Production Service Branch, who spoke about the shortage developing in skilled man power in the machine tool industry in this district and of the means being used to improve the situation.

After a brief recess Mr. W. T. Towers of the U. S. Tool Company, Inc. at East Orange, New Jersey, gave a very interesting talk on milling machines and multiple slide sheet metal forming machines that use flat sheet steel drawn from coils. He illustrated his subject with slides and several reels of motion pictures of the machines in operation.

Rochester

The first fall meeting of the Rochester Chapter was held on Wednesday, September 16th. Held in the Green Room of the Sagamore Hotel it was called to order by Chairman Cliff M. Sears.

Vice Chairman Joe Schick introduced Adrian L. Potter, National Executive Secretary of the Society, who gave a talk on the problems and objectives which he hopes will be accomplished by the National Headquarters.

Ex-Chairman Lucas put on a movie showing the effect of several types of cutting compounds on the plain turning of steel. The purpose of this picture was to show that cutting compounds do not act as lubricants, but that their sole function is that of a coolant. Also included in this meeting was an open discussion led jointly by Ralph Weddel and Charlie Franklin. Problems pertaining to broaching, punching and threading were discussed. After this discussion period a buffet luncheon was served.

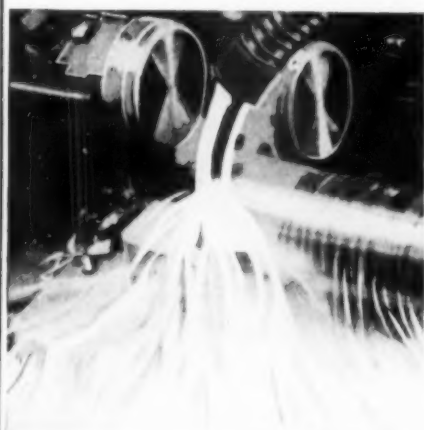
St. Louis

The St. Louis Chapter held its monthly meeting on October 8th at the Hotel Melbourne. The largest dinner reservations ever recorded in the history of the Chapter resulted in the largest attendance to a monthly meeting.

Mr. Malcom S. Judkins, chief engineer Firthite Division, Firth Sterling Steel Company, presented a lecture and motion picture on "The Design, Manufacture and Use of Cemented Carbide Tipped Tools."

San Diego

The San Diego Chapter held its
(Continued on page 146)



*It's a
critical
spot*

... that place where cutting operations are performed —where cutting edge meets raw stock. Here every factor must be at top efficiency to make production move without interruption. Operating even with the finest tools and equipment, production can be made to suffer seriously if the coolant fails.

Pioneer Pumps for years have proved themselves reliable guards of coolant flow in the leading plants over the country. And today especially, when speed is the watchword for all industry—Pioneers, more than ever, are meeting the increasing demands.

PIONEER PUMP AND MANUFACTURING COMPANY

19645 JOHN R STREET • DETROIT, MICHIGAN



No. 2 in a series showing why "**TOMAHAWK**" tools do a better job of both machining and helping the war effort.

Double-end TOMAHAWKS *.....do Double duty.....*

When ordering special forming tools it is frequently a good idea to buy them double-end. You can thus get two tools in one, save precious high speed steel and double the life between grinds.

Just turn the tool around the first time it needs sharpening.

Such tools also reduce grinding time and cost, since it takes less time to grind both ends of the tool at one time than to grind each end separately at different times.

It is not always possible to use double-end forming tools of course. You want to be sure that your tool support will protect the other end of the tool.

But it's worth looking into. There are many such **TOMAHAWK** tools in effective use today.

Send for "Streamlined" Catalog No. GT-42
on your company letterhead.

GENESEE TOOL COMPANY
F E N T O N , M I C H I G A N



★ Registered
Trade Mark

meeting on September 22nd following a 9:00 o'clock breakfast in the Gold Room of the U. S. Grant Hotel. Chairman J. J. Tucker, who presided at this meeting, brought 50 visitors from the Naval Air Station, Mr. Eagle, chief tool engineer of Rohr Aircraft was introduced by Mr. Wm. Connell, who in turn introduced 15 fellow workers of the Rohr Tooling Department. Other visitors included those from Consolidated Aircraft Corporation, Mr. Ray Gray, Mr.

Jack Williams, Mr. J. Harrison and Mr. Monte George.

At this meeting Mr. Chas. Lord was installed as first vice chairman and Mr. J. A. Stroble as second vice chairman. The oath of office was given by Mr. Jack Marvin, treasurer of the Los Angeles Chapter.

Dr. H. F. Holmholz, Jr. of Consolidated Aircraft Corporation gave a short talk on the effects of altitude on the human mechanism.

The speaker of the morning was

Mr. Dick Smith of the Cook Heat Treating Company whose topic was "Heat Treating of Tool Steels." In connection with Mr. Smith's talk, a forty-five minute picture on "Heat Treating Hints" by Lindbergh Engineering Company of Chicago was shown.

(San Francisco) Golden Gate

The first regular fall meeting of the Golden Gate Chapter of the Society was held on September 8th at the City Club Hotel in Oakland with the newly elected chairman, Mr. Walter Kassebohm, presiding.

After the regular business meeting, an outstanding program was put on by Mr. Dave Kaye, chief safety inspector for Kaiser Company, Inc., Yard No. 3. Mr. Kaye started his program by showing several reels of General Electric Company's technicolor sound picture entitled, "The Inside of Arc Welding." These pictures are being used for instructing the trainees in the classes being conducted at the yards.

Mr. Kaye gave a talk entitled, "The West Coast Shipbuilding Industry and the Building of Cargo Ships." He described the prefabrication of the ships. Two entire deck houses are being fabricated at one time on the assembly lines. The Stern portion, deck plates, double bottoms, side plates and many more sections are being prefabricated. Mr. Kaye mentioned that in many instances portions of the ship were built upside down so as to permit welding of seams in the horizontal position.

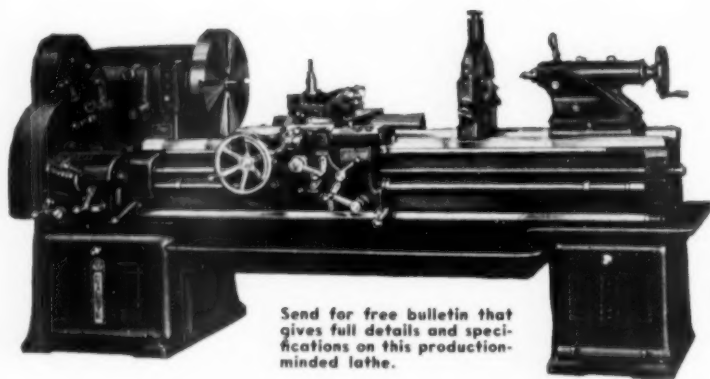
Schenectady

The Schenectady Chapter held its September meeting at the Ten-O-One Veteran's Memorial Hall in Scotia, New York. 45 members were present for the dinner, which was served at 6:30. The technical meeting was called to order by chairman Tocher at 7:30. Mr. Tocher has succeeded Mr. Harry Crump, as the Chapter chairman. Mr. Crump was transferred during the summer to the Carboly Company in Detroit. This left the position of first vice chairman to be filled by special election. N. Y. Coxie was elected as first vice chairman and G. E. Lauterborn as secretary to fill the position vacated by Mr. Coxie.

Mr. Wilke gave a description of the methods used for flame cutting in the

(Continued on page 148)

64 FEED AND CUTTING CHANGES



Send for free bulletin that gives full details and specifications on this production-minded lathe.

The quick change box is a one piece casting constructed to preclude the entrance of chips and dirt and houses the mechanism for feed and thread cutting changes. There are 64 changes including $11\frac{1}{2}$ threads, covering a wide range without the necessity of extra pick-off gears. Simple and easy to operate, changes can be made instantly. The gears are alloy steel with accurately cut teeth. All the sliding gears have pointed teeth and are mounted on splined shafts to facilitate easy engagement. Just the lathe for your War Shop!

BRADFORD



Metalmaster

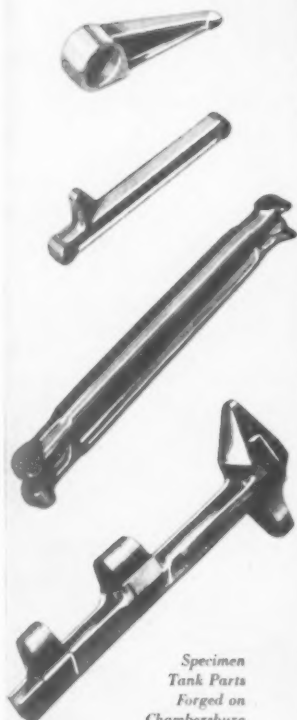
LATHE

ALSO MANUFACTURERS OF DRILLING AND TAPPING EQUIPMENT

THE BRADFORD MACHINE TOOL CO.

EVANS STREET SOUTH OF EIGHTH, CINCINNATI, OHIO

PRECISION TOOLS SINCE 1840



*Specimen
Tank Parts
Forged on
Chambersburg
Hammers*



*Airplane
Engine Parts
Forged on
Chambersburg
Hammers*



FORGINGS COME FIRST



Forgings are vitally essential to the war effort because airplanes, tanks, ships and guns must be built to "withstand the unpredictable" . . . for which specification there is nothing to equal the strength and durability of the drop forging. ★ Before the cutting and grinding machine tools bring these parts to their final microscopic perfection, they are first forged to close limits, by tremendous impact between steel dies, in great drop hammers, such as those bearing the time-honored name of **CHAMBERSBURG**. Metal is saved, time is saved . . . and Victory brought closer . . . by the speed, power and accuracy of Chambersburg Hammers.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

THE CECOSTAMP
Airplane and other sheet metal parts of high strength alloys are formed quickly and without distortion on the Chambersburg CECOSTAMP.

The Cecostamp is an impact stamping machine of exceedingly flexible control, designed by Chambersburg Engineering Company specifically for the aviation industry.

CHAMBERSBURG

HAMMERS • CECOSTAMPS • PRESSES

arc welding department. Chairman Tocher then introduced Mr. W. C. Hutchins, of the Civilian Defense Organization, who spoke concerning home defense and the need for disseminating information to the general public on actions to be taken during air raids.

Principal speaker for the evening was Mr. C. M. Ripley of the publicity department of the General Electric Company. Mr. Ripley spoke on "Power for War" and demonstrated

a number of new developments contributed to the war effort by industry.

Seattle

The September meeting of the Seattle Chapter was held at Crawford's Sea Grill September 8th. The meeting was called to order by Chairman W. E. Ainsworth with 36 tool engineers and five guests present.

Mr. Ainsworth introduced Mr. Harold Lillihee, a tool engineer with the Puget Sound Navy Yard, who has visited all the navy yards in the

United States in a program to educate personnel in the conservation of cutting tools, particularly tungsten. He gave an interesting talk on this subject and his experiences on this trip.

Following Mr. Lillihee's talk, Mr. Clint Swift, welding engineer for Ampco Metal, gave a talk on the brazing of tools and the application of various bronze welding rods to dies.

Syracuse

The Syracuse Chapter held its October 13th meeting in the Hiawatha Room of the Onondaga Hotel. 23 attended the dinner and 30 the meeting following. Steve Urban, vice chairman, presided at this meeting and Mr. A. E. Rylander, Master Mechanic at Midland Steel Products Co., Detroit, and A. S. T. E. Editorial Chairman, was the speaker of the evening. "Handy Andy" spoke on the subject of "Winning a War and Shaping a Peace with Tools." In his talk he digressed from the purely technical problems and gave an interesting discourse on the causes of the war, and conditions as they exist in the old countries today. He stressed the fact that all our ingenuity will be needed to keep ahead of the Axis nations in the production of armaments for the successful conclusion of the war.

Mr. C. J. Reed, of Air Cooled Motors, won the door prize — a fine electric razor.

(Springfield, Vermont) Twin States Chapter

The October meeting of the Twin States Chapter was held at the Springfield Masonic Temple on the night of October 8th. Following the dinner and the short business session, Mr. E. V. Flanders introduced the speakers. The speakers of the evening were Mr. J. Robert Moore and Mr. Richard F. Moore of the Moore Special Tool Company of Bridgeport, Connecticut. Mr. Richard Moore described the work the two brothers have done in the development of high precision dies. He chose as an example the dies developed for the manufacture of the complicated plates which are elements of the time fuse used on our anti-aircraft shells.

Mr. Robert Moore then took the platform and described some of the problems encountered in the development of his high precision jig grinder

(Continued on page 150)



Precision parts and assemblies for automatic time and contact fuzes, are produced COMPLETE PER STROKE on Dieing Machines at far greater speeds than ever before.

Dieing Machines make intricate ammunition parts COMPLETE PER STROKE

The split-second functioning of a time fuze; the delicate action of a contact fuze so sensitive as to detonate on meeting fabric; the flawless functioning of cartridge clips and machine gun belt links — for these and many other ordnance purposes, Dieing Machines are producing stampings of surpassing accuracy at amazingly high speeds. Producing 1 to 20 completed parts per stroke from flat material, one Dieing Machine equals 5 to 10 conventional presses. What is more, this unique press has WIDENED THE SCOPE of stamping, replacing screw machine production and performing unusual and difficult operations foreign to stamping—all at greatly increased production and with precision of product to .0002" when required. Capacities: 10 tons to 300 tons. EXPERIENCED MUNITIONS STAMPING COUNSEL, YOURS FOR THE ASKING.

Making scores of Munitions Items at new high rates

STAMPINGS

Machine gun belt links
Mechanical time and contact fuze parts
Rifle components
Cartridge clips, or rifle chargers
Gas mask stampings
Ammunition stampings
Bomb components
Shell parts
Detonator stampings
Airplane instrument, engine and fuselage parts

OPERATIONS

Bullet assembling
Primer inserting
Automatic time and contact fuze assemblies

Request Catalog 42



Machine gun belt link produced complete one per stroke to extreme precision limits at exceptionally high speed.



Cartridge clip for caliber .303 rifle produced complete one per stroke at record-breaking high production.



INCLUDING BROACHING
Airplane fuselage hinge of duralumin produced complete per stroke in continuous strip to high precision including BROACHING.

THE HENRY & WRIGHT MFG. CO.

446 WINDSOR ST.
HARTFORD, CONN.

HENRY & WRIGHT DIEING MACHINES

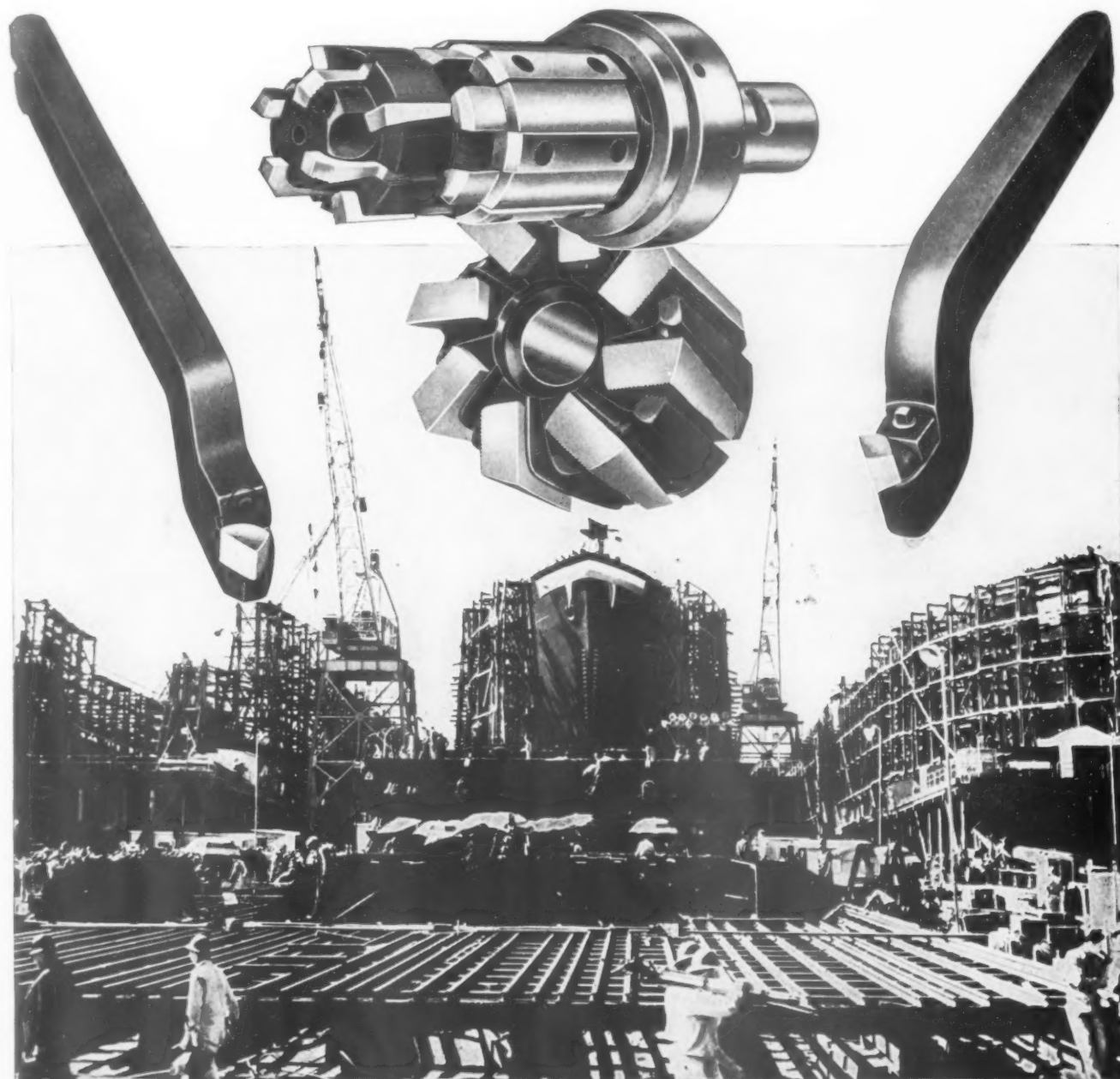
High-Efficiency Tools for the Builders OF "SHIPS FOR VICTORY"

Because of their high efficiency, O K Inserted-Blade Metal Cutting Tools are extensively used in producing turned, milled and planed parts for our Government's Victory Ships.

In the O K System, only the cutting edges are made of high speed steel. The bodies, whose sole job is to withstand strain, are made of drop-forged alloy steel. The cutting edges (bits or blades) are available

in shapes for all standard metal cutting operations, and may be ground for special cuts and kept on hand. This makes the System extremely flexible, saves much valuable time, effects a marked conservation of high speed steel.

The O K System includes milling cutters, end mills, face mills, boring heads, reamers, counterbores; also single point tools for lathes, shapers and planers.



INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

MANUFACTURED ONLY BY THE O K TOOL COMPANY, SHELTON, CONN., U. S. A.

on which it is said to be possible to attain hole locations accurate to .0001 inch.

The concluding feature of this program was a technicolor, talking motion picture entitled "Cannon on Wings" showing the Bell Aircobras in action and salient features in their production.

Toronto

The Toronto Chapter was privileged to be the guest of the John Inglis Company on October 9th. Almost 150 turned out to dinner in one

of the Inglis cafeterias, where a short talk on the operations of the plant was given by works manager McLaughlin, who also introduced the various department heads who were present.

About 25 of the company's engineers then acted as guides on the two-hour tour of the Bren, Boys and Browning gun departments. These departments are vastly different in capacity to what they were a year ago and have not even now stopped expanding.

Of particular interest was the plant

of the associated company, Cutting Tools and Gauges Ltd., which specializes in tool salvage, in addition to the manufacture of new tools. A government-owned company, this plant cuts down, remodels, or otherwise makes available for re-use, the valuable high speed steel in broken, obsolete, or worn-out cutters.

Wichita

The Wichita Chapter held its first fall season meeting on Tuesday evening, September 29th, at the Allis Hotel in Wichita. 125 members were present for dinner and the meeting was presided over by Chapter chairman Carl Burnham.

Following dinner, a Warner & Swasey Company representative showed a film entitled "Chips."

Williamsport

The first fall meeting of the Williamsport Chapter was held at the First Evangelical Church on September 14th.

At this meeting Mr. Burrell Troxell was elected secretary to take the place of Mr. Lewis Bleicher. Mr. Elwood Shollenberger was elected publicity manager to take the place formerly held by Mr. Troxell.

After a general discussion involving meetings, speakers and entertainment, the meeting was turned over to Mr. Raldo Shipman, who showed talking movies on "Machining Aluminum" and "Welding Aluminum." These films were just released by the Aluminum Company of America.

Worcester

The Worcester Chapter held its October 6th meeting with supper at Putnam and Thurston's. Chapter friend, Ray Cole, was welcomed back at this meeting. Visitors at this meeting included Mr. Robert Palmer of the Hartford Chapter and Mr. Stanley Rowee of the Boston Chapter.

Coffee speaker was Mr. Walter B. Dennen, director, Worcester Boy's Trade School who spoke about training women for industry and gave some interesting facts about what has happened in Worcester concerning this subject.

The technical subject was handled by G. H. Sanborn, sales engineer with the Fellows Gear Shaper Company of Springfield, Vermont. His subject was "Cutting Gears and Other Parts with a Reciprocating Generating Tool." This talk was illustrated with slides.

(Continued on page 152)



Woody Spencer says...

"YOUR HIGH SPEED TOOL STEEL SCRAP IS BADLY NEEDED . . . MAKE THIS YOUR CONSERVATION PROGRAM..."

1. DO NOT THROW AWAY ANY SCRAP.
2. SEGREGATE HIGH SPEED TOOL STEEL SCRAP FROM REGULAR SCRAP METAL.
3. WHEN A REASONABLE AMOUNT HAS BEEN SAVED, SEE THAT IT GETS BACK TO THE STEEL MILLS THROUGH THE PROPER CHANNELS.

Do not return to Wood & Spencer.

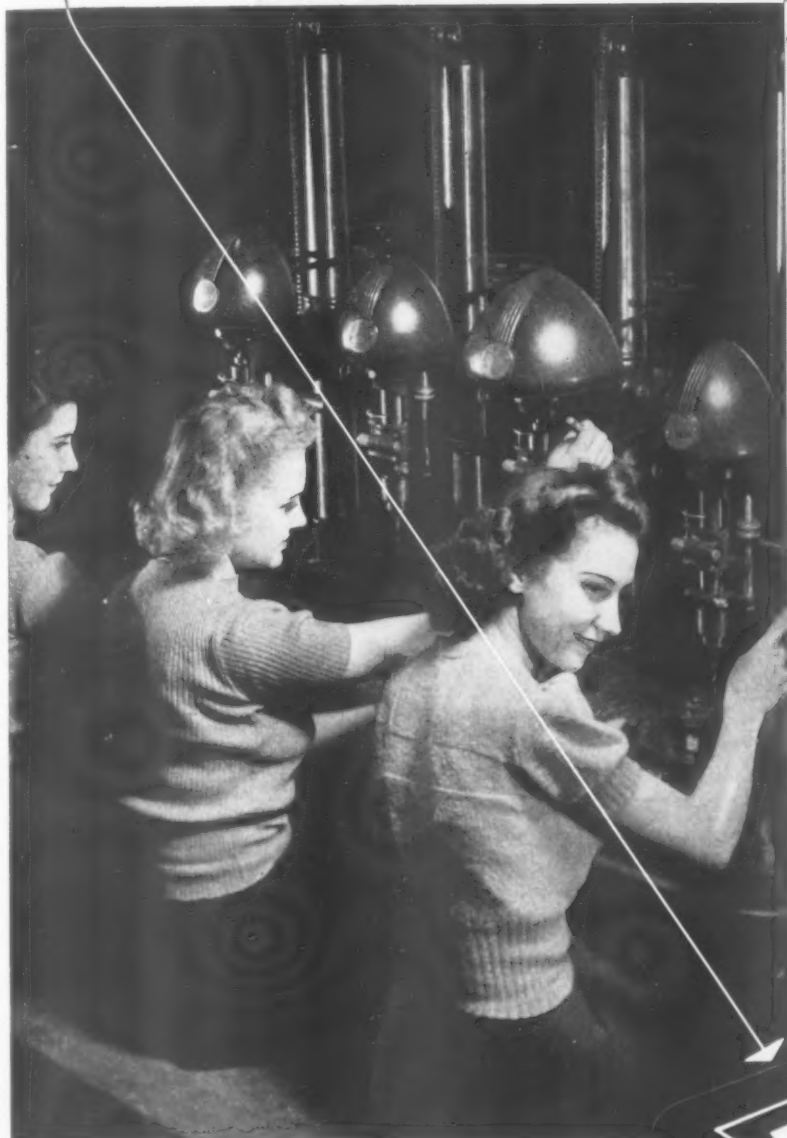
You can cut down waste on taps by carefully selecting the right tap for every job. We'll be glad to help you . . . write on your company letterhead for our latest catalog.

"THE RIGHT TAP AT THE RIGHT TIME"

The Wood & Spencer Company
Cleveland, Ohio



THE NEW LABOR ARMY LIKES THESE MACHINES



These "minute women of '42" by the hundreds of thousands are setting a smooth fast pace on batteries of Delta low-cost Drill Presses, Grinders, Saws, and other Delta machines. A few months ago they didn't know the difference between a drill press and a punch press—a cut-off machine or cut-off switch. Now they are handling their machines like veterans and meeting production quotas with ease.

Management likes these machines too, because "breaking in" women and unskilled labor can be done in an unusually short time. Most important, skilled mechanics are released for more difficult work.

DELTA DESIGN

always offers these Advantages

- Low First Cost
- Low Maintenance Cost
- Economical Operation
- Reduced Labor Costs
- Greater Flexibility
- Portability



SEND FOR "TOOLING TIPS"

Showing how other manufacturers are taking advantage of the many features of DELTA-Milwaukee machines. Also for latest complete catalog. Get in touch with your Delta Industrial Distributor or write to the Delta Manufacturing Company, 610-M E. Vienna Ave., Milwaukee, Wis.



The Complete DELTA-Milwaukee line consists of low-cost, high-quality Drill Presses, Cut-Off Machines, Grinders, Abrasive Finishing Machines, Saws, Lathes, Jointers and Shapers.

CHIPS FROM A. S. T. E.
NATIONAL HEADQUARTERS

This is the membership supervisor at the National Office. He is W. Francis Quigley ("QUIG" to you) who develops wrinkles in his forehead and shadows under his eyes worrying about the applications for member-



W. Francis Quigley
A.S.T.E. office membership supervisor.
ship which continue to flow into National Headquarters. He probably would appear much younger and much

less worried if all the applications were properly made out and contained the information which should be there. If the facts contained in the original application are not sufficient to entitle an applicant to membership, there is no use in passing the application along and it must go back to the Chapter where it originated. "Quig" is always fearful that someone really eligible for membership will be turned down for lack of information. His favorite expression is, "Gosh, I wish these fellows would give us the complete information the first time." He suggests that the applications be checked carefully before they are sent to the National Office.

The folks at the National Office do a lot more than twiddle their thumbs. Drop in some day and you will find the mimeograph machine humming, the folding machine busily preparing material for insertion into envelopes made ready on the addressing machine for the sealer and the postage meter. Just as an indication of what goes on in the mailing room we find that during September, 15,-

281 pieces of mimeograph work were processed for distribution to the membership. 20,060 Standard Data sheets were collated, packed, wrapped, addressed, stamped and mailed to members. Come up and see us busy sometime!

* * *

While we are talking about detail work at the National Office, we must not skip another mention of those post cards sent to each member of the Society requesting latest information about addresses. They are still coming in but already we have received more than 1200 such changes. More than a tenth of our membership has changed address or employment. To make the necessary changes in the records requires seventeen operations — in other words to bring our records up to date has so far required more than 20,000 operations.

* * *

The National Office has been preparing for many weeks for the Semi-Annual meeting at Springfield, Massachusetts and when you read this it will all be over. Your "Chipper" does

(Continued on page 196)

FOUR WAYS TO SPEED UP TO VICTORY

(FOUR WAYS TO SAVE TIME AND MONEY)

✓1 TUNGSTEN CARBIDE LATHE AND GRINDING CENTERS

Circle Tip Tool Company's centers are equipped with a hard wear and gall resisting metal, lasting from 50 to 100 times as long as high speed steels. Standard sizes in stock, special centers made to order.

✓2 TEN STANDARD CARBIDE TIPPED TOOLS

Available for immediate shipment in two grades of "Tamaloy," a new Tungsten Carbide, Circle Tip standard tools are finished ground, ready for use, or may be reground to meet your particular cutting problems.

✓3 "TAMALOY" CARBIDE BLANKS

"Tamaloy" blanks can be furnished in special shapes approximately .015" oversize, allowing you to make your own form tools. Standard "Tamaloy" blanks from stock.



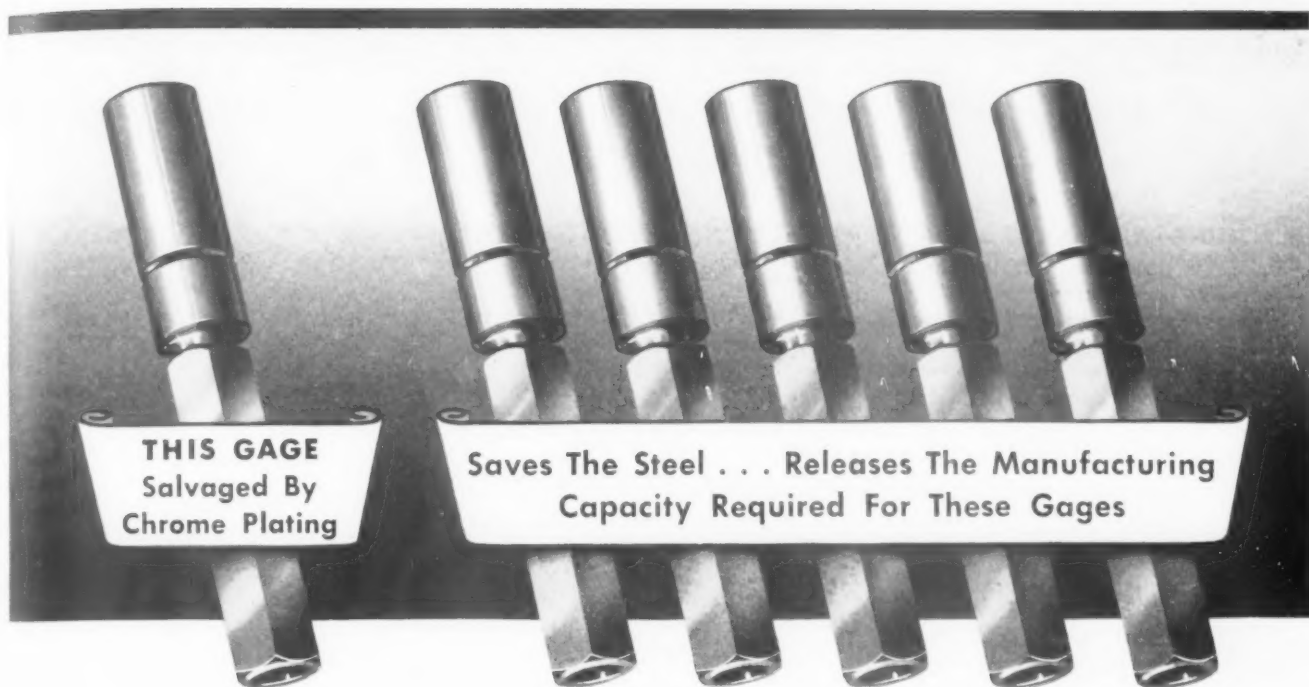
HIGH RESISTANCE TO ABRASION

✓4 SPEEDALOY

Speedaloy is a cast cutting alloy made of a special Tungsten Chromium alloy. It fills the breach between high speed steels and Tungsten Carbide in both performance and price. Speedaloy comes in solid Tool bits, flats and tipped tools.

CATALOG AND PRICES ON REQUEST

The CIRCLE TIP TOOL COMPANY Inc., EAST ORANGE, N.J.



and Assures Proportionate **INSPECTION USEFULNESS**

The average wear-resistance of a Lincoln Park chrome plated gage is approximately five times that of a similar steel gage.

Today, thousands of worn gages and non-cutting precision tools are no longer discarded and replaced by new gages and tools in which critical metals are used, and for which many man and machine hours are required in manufacture. Instead they are salvaged by Lincoln Park processes in which they are carefully prepared for plating, are hard chrome plated, and then finished to specified tolerances. When completed, they are ready for a service life far exceeding their original period of service.

In addition, Lincoln Park chrome plated gages can be specified to much closer required limits than steel gages. Because allowances for wear can be reduced considerably, your production departments get the resulting benefits of greater manufacturing tolerances.

It's good business on your part . . . it's a definite contribution to the War Effort . . . to have Lincoln Park put new life and greater usefulness into all of your gages which can be salvaged by chrome-plating.

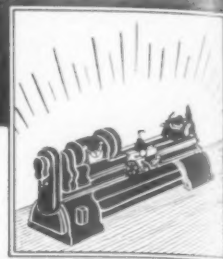


LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN

NEW EQUIPMENT, Materials, Processing

T.M. REG. U.S. PAT. OFF.

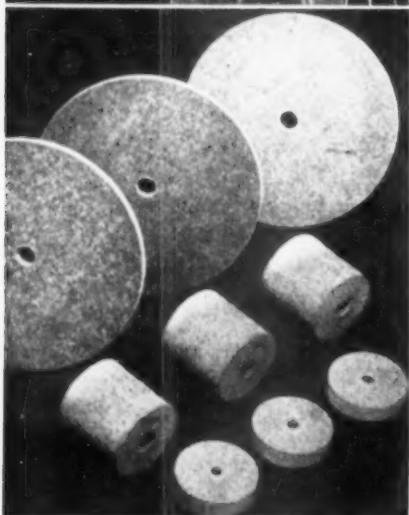
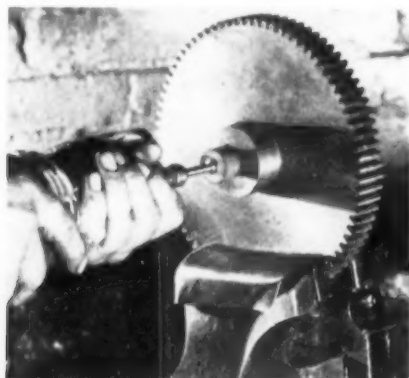


FINISHING WHEELS (J4)

Called the "MX" wheel, this new product, recently introduced by The Carborundum Company of Niagara Falls, New York, is said to be applicable to such operations as breaking down burrs or sharp edges on gear teeth, finishing and polishing spline grooves, polishing internal diameters, for smoothing down sharp edges of holes, and for all types of undercuts and finishing out depressed areas.

Made in grits of 50, 80, 120, 180, and 320, these wheels are made up of thin discs. The discs are cotton fibres intimately impregnated or mixed with either the uniformly graded grains of Aloxit Brand Aluminum Oxide or Carborundum Brand Silicon Carbide. The wheels, made up of the discs bonded together to form various diameters and thicknesses, are so fabricated as to give various degrees of resiliency and flexibility.

Made in six grades of hardness, they are to be used dry, without any coolant.



Carborundum's MX Wheels
Used without any coolant.



New Gorton Electric Arc Etching Machine
Said to deeply etch hardened parts without burr.

on any type of flexible shaft machine or electric hand grinder. Instructions say that they should be mounted between relieved flanges and should be dressed with an abrasive stick as required. Recommended operating speeds range from 6000 to 8000 S.F.M.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

ELECTRIC ARC ETCHING MACHINE (J5)

A new, all-purpose production etching machine, which is said to deeply etch hardened parts without burr, has just been developed by the George Gorton Machine Company of Racine, Wisconsin. The turning of a dial regulates the machine for either deep or light etching. Because of the extension arm in the design of the machine, it is claimed that etching is now possible in previously inaccessible places such as inside a cylinder or along both sides of a V-block.

Etching depth varies from .0001 inch to .003 inch. The diameter of the electrode used determines the etching width, which in this case varies from .0075 inch to .015 inch. Characters may be

varied in height from 1/32 inch to much larger sizes.

The etching is done by a tungsten wire electrode, oscillated vertically 120 times per second by a magnetic motor. It is claimed that any unskilled operator can handle this machine after a few minutes practice. The operator traces along the lines of the master copy with one hand and holds down the feed button with the other. The etcher electrode wire reproduces this tracing in reduced size, the size being controlled by the setting of the pantograph.

The "Spit-Fire" unit, consisting of etcher head and control panel in compact carrying case, is furnished as standard equipment for the model AE machine. However, the portable unit may be purchased separately as it is designed to fit any conventional pantograph.

DUPLIMATIC CONTROL (J6) WITH BULLARD LATHE

This machine tool control manufactured by the Detroit Universal Duplicator Company, 253 St. Aubin Avenue, Detroit, has recently been applied to a standard Bullard lathe to form-turn forged torpedo parts automatically. The use of the Duplimatic to turn the horizontal and vertical feed screws of the lathe is said to have resulted in stepping up production on the roughing cut and greatly reduce hand-finishing.

This set-up includes two drive heads

(Continued on page 157)

FREE INFORMATION and SERVICE

Request the information and service you desire and keep your library up-to-date...

THREE FREE SERVICES... WITHOUT OBLIGATION

For your convenience, these three business reply cards enable you to request quickly...

1 New catalogs—bulletins listed in this issue.

2 Additional information or bulletins relative to new equipment—new materials or new processes.

3 When answering advertisements, specific information on problems or company representative's call.

HOW TO ORDER

Simply fill out the card, indicating the information or service you desire, and mail. Be sure to write, in the square, the identifying number of the catalogs or bulletins covering new products described. In answering an advertisement, include the name of the advertiser and indicate by a cross if literature is desired or if company representative should call. No stamp is required.



USE THIS CARD for requesting new catalogs and bulletins listed in this issue.



USE THIS CARD for requesting additional information or bulletins relative to new equipment, materials, processes, etc.



USE THIS CARD when answering advertisements, to obtain specific information on problems or when you desire a company representative to call.

Write in square, number of item describing one catalog wanted →

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THE TOOL ENGINEER, NOVEMBER 1942

Write in square, number of item describing one catalog wanted →

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THE TOOL ENGINEER, NOVEMBER 1942

USE THESE **FREE** REPLY CARDS

They are provided for your convenience in requesting information and service

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NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

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THE BRAMSON PUBLISHING COMPANY

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DETROIT, MICHIGAN

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PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.



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**NEW CATALOGS
BULLETINS
BOOKLETS**

BUSINESS REPLY CARD

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Request for additional information and catalogs covering

**NEW EQUIPMENT
MATERIALS
PROCESSES**

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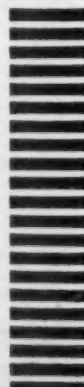
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DETROIT, MICH.



**ANSWERING
ADVERTISEMENTS**

Requesting:

**LITERATURE
REPRESENTATIVE
TO CALL**

which consist of hydraulic motors and reduction gearing. These drive heads are directly connected to the vertical and horizontal feed screws and are also connected, by means of heavy duty hose, to the Duplimatic shown in the foreground of the accompanying illustration. So arranged that its stylus can encounter the edge of a metal template which is mounted on the head and moves with the cutting tool, the tracer mechanism is mounted on the bed of the lathe.

When the start button is pushed, the tool approaches the work, the stylus of the tracer encounters the template and, through the function of the Duplimatic, turns the horizontal feed in relation to the vertical feed so that the tool moves in exact conformity with the outline of the template.

Both the roughing and finishing cuts are made on this same machine with the use of the Duplimatic. Changeover to manual control requires only "de-clutching" of drive heads and removal of tracer head.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

NEW FORGE WELDER

(J7)

The "Temp-A-Trol" forge welder, a machine representing an entirely new approach to "resistance welding", makes possible combined automatic spot welding and heat-treating of alloy steels and heavy sections. The manufacturer is Progressive Welder, 3050 E. Outer Drive, Detroit, Mich.

The machine employs a new method of control, the weld automatically controlling the functioning of the machine. Resistance welding equipment has been operated mainly through the use of pre-selective controls regulating the amount and duration of current. Settings were determined by trial and error to give the best compromise for the "average" weld in a given material of a given section. When operated in this manner, it has been pointed out, few welds are identical as to quality.

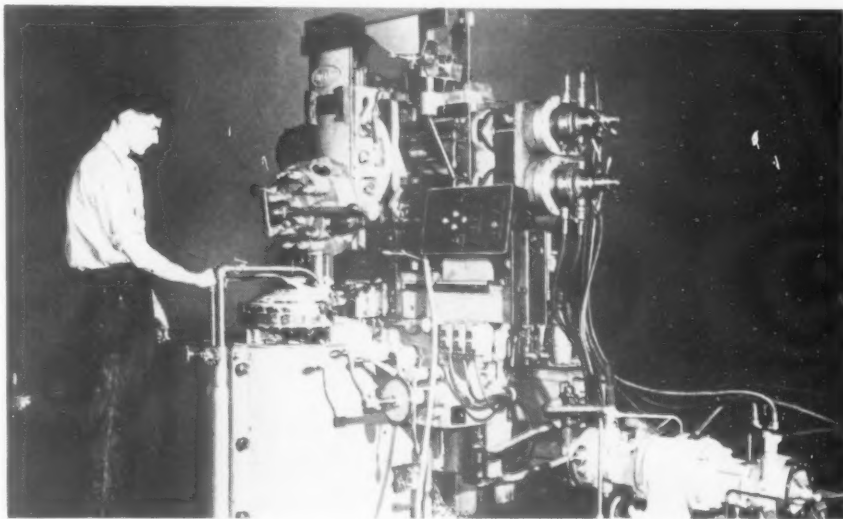
Thus many types of resistance welding operations previously have required close supervision of handling by skilled personnel, especially when welding heavy sections and alloy steels.

The flexibility and simplicity of this new welder is demonstrated by the fact that without changing the machine controls, welds of exactly equal quantity can

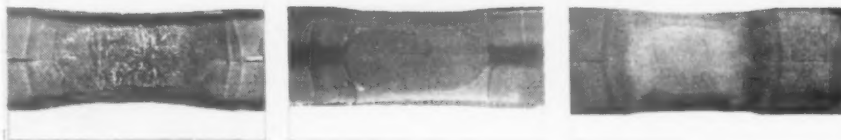
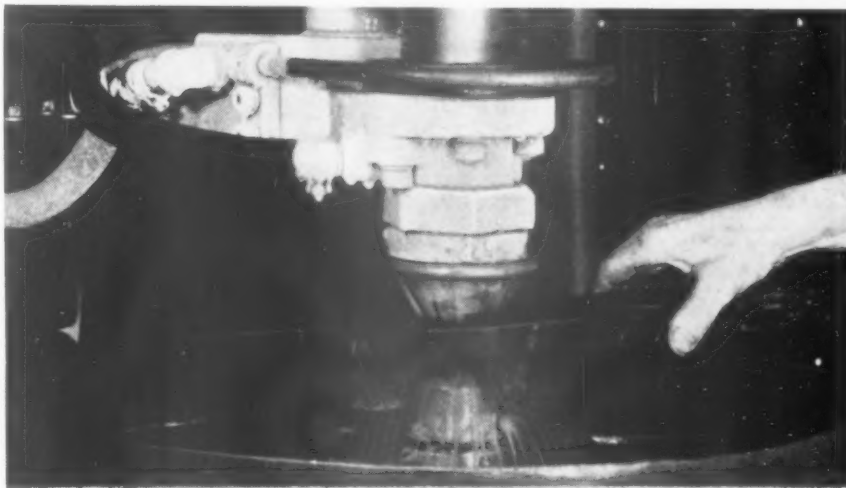
be produced consecutively in $\frac{1}{4}$ to $\frac{1}{4}$ inch, in $\frac{3}{16}$ to $\frac{1}{4}$ inch, in $\frac{1}{4}$ to $\frac{3}{8}$ inch, or in sections of $\frac{1}{4}$ inch material at the same time.

The "Temp-A-Trol" welder, it is said, can be used to automatically heat-treat

cooling. Lower cut shows a typical "Temp-A-Trol" weld in three stages. At left, the coarse grain structure characteristic of spot welds in heavy sections; center, after the first post-heat; at right, after the second post-heat or final weld.



The Duplimatic Control As Applied to a Bullard Lathe
Helps form-turn forged torpedo parts automatically.



"Temp-A-Trol" Forge Welder Introduced by Progressive
Entirely new approach to resistance welding.

the weld in the same operation. This post-heat refines the grain size of the weld, increasing its ductility, gives the proper grain structure and "tempers" the weld nugget and surrounding area to any desired amount consistent with the characteristics of individual alloys.

Top figure shows the "Frostrade" unit in the "Temp-A-Trol" forge welder maintains electrode temperature and uses cooling jets of water to expedite

NEW TURRET LATHE

(J8)

Listed among the features of a new Foster universal ram type turret lathe recently announced by the International Machine Tool Company, Foster Division, Elkhart, Indiana, is the fact that it has a 2 inch collet chuck capacity with a $17\frac{1}{2}$ inch swing over the ways. Supplied with tools for both bar and

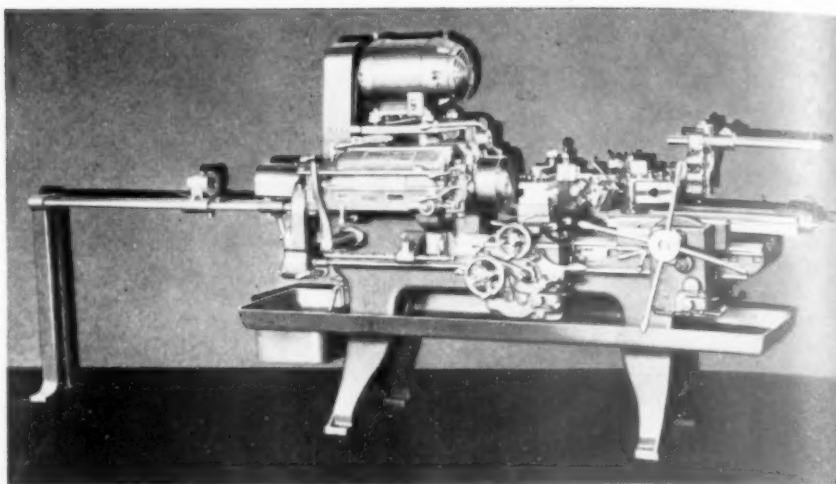
(Continued on page 158)

—NEW EQUIPMENT—

chucking work, this machine will accommodate 8, 10, and 12 inch diameter chucks.

This machine also may be equipped with special attachments such as bar feed and collet chuck, taper attachment, and threading attachment for specific applications or types of turret lathe work. The lathe is equipped with double vee ways and the one piece bed and headstock is cast from nickel semi-steel.

Individual motor drive is provided for the machine with the motor mounted on the headstock. Various types of motors may be selected, depending on the work



New Foster Ram Type Turret Lathe
Has individual motor drive.

for **LESS SCRAP** in your plant and
more *"Scrap"* on the fighting front!



TUNGSTEN CARBIDE tipped standard reamers by Super Tool are the best that money can buy—and the most economical from every point of view.

They cut faster, cleaner, truer. They save time and reduce scrap—hold their size over extremely long runs—give you more production, and speed the stuff out to our fighting men.

Many standard sizes in stock for quick delivery—in semi-finished



Straight Shank

Taper Shank

form for completion to your sizes. Send us your inquiries and ask for Bulletin R-1.

SUPER TOOL CO.

21640 HOOVER RD.

DETROIT, MICH.



CARBIDE TIPPED TOOLS

FOR TURNING - FACING - REAMING - SPOTFACING - BROACHING
FORMING - GRINDER RESTS - WEAR PARTS - BORING - MILLING - DRILLING
GROOVING - COUNTERBORING - SHAVING - CENTERS - SPECIAL PURPOSES

to be done. The universal carriage has 6 reversible cross and longitudinal feeds which are engaged by individual levers that operate large diameter friction type clutches. In many parts of the machine, lubrication is automatic. With the headstock serving as a reservoir, all gears and bearings run in a bath of oil.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.



Kent-Owens Multiple Spindle Head
Mills several notches at once.

MULTIPLE SPINDLE HEAD

(J9)

Designed to simultaneously mill a number of staking notches in shell noses, this new multiple spindle head has been recently placed on the market.
(Continued on page 160)

LOVEJOY MILLING CUTTERS



THEY GIVE AN EXTRA MARGIN OF PRODUCTION
TO BOTH OLD AND NEW MILLING MACHINES

Rugged Lovejoy Milling Cutters are taking 24-hour production schedules in their stride. They are giving maximum results on all types and ages of milling machines.

They are also reducing down-time with the positive-locking feature obtainable only in Lovejoy Mills. Not only are the blades interchangeable, but they are easily removed, quickly sharpened, and readily replaced. You can get more work out of every blade, because they require less grinding to resharpen. This is another reason why Lovejoy Mills soon pay for themselves.

Reduce costs and down-time — increase production with Lovejoy Positive-Locking Milling Cutters.

MAIL THE
COUPON
TODAY

Please mail me the 24-page Lovejoy catalog covering the full line of Lovejoy Mills.

NAME.....TITLE.....

COMPANY

STREET

CITY.....STATE.....
T. E.

LOVEJOY TOOL COMPANY, INC.
Springfield, Vermont, U. S. A.

ket by Kent-Owens Machine Company, Toledo, Ohio.

Multiplying production over the old method of milling one notch at a time, this new method makes use of a 5-spindle head which mills all 5 staking notches in a typical shell at one time as is shown in the accompanying illustration. The fixture shown is designed so that the shells are rolled on to it from an adjoining conveyor, the machining operation is done, and then the shell rolled back onto the conveyor.

This unit can be adapted to the Kent-

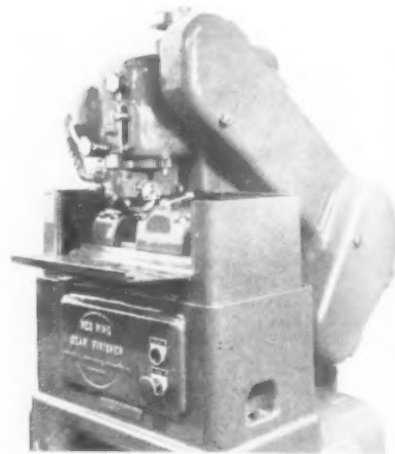
Owens I-8 and the I-M machines, the former with hydraulic feed to the table and the latter with hand feed to the table.

FINISHING OF INSTRUMENT GEARS (J10)

A new small gear shaving machine, known as the Red Ring Model GCL-3 inch gear shaving machine, has recently been developed by National Broach and Machine Company, Detroit. Because war production has greatly increased the demand for small gears for use in

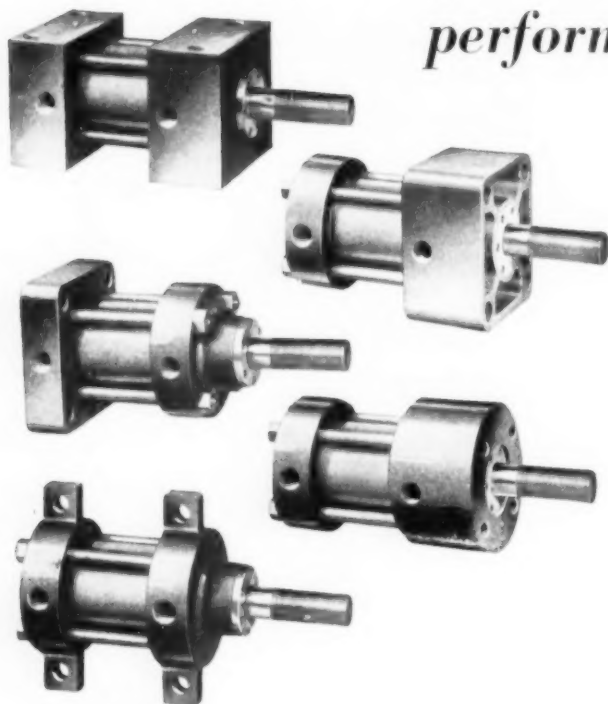
navigation instruments, range finders, and gun and bomb sights, this machine is said to have been developed especially to speed the finishing operation on such instrument gears.

These gears must have a high degree of accuracy in pitch diameter, tooth



New Small Gear Shaving Machine
Finishes gears in 8 to 48 seconds.

Accurately machined for mounting as well as for performance



on **(T-J)** Hydraulic Cylinders...

- The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder.
- All surfaces are as square and smooth as is warranted.
- All mounting holes are drilled — not just cored.

This workmanship makes for better installation, admirable appearance on the job and what is better yet, of course, insures a longer life of more efficient performance. Catalog sent upon request.

THE TOMKINS-JOHNSON CO.

624 NORTH MECHANIC STREET

JACKSON, MICHIGAN

spacing, and tooth profile. It has been the practice to cut these gears in the conventional manner, correcting dimensional errors by taking very fine finishing cuts with a gear cutter, hobber, or shaper. This is usually a time-consuming process, but this new machine is said to finish these gears in 8 to 48 seconds.

Essentially a bench type machine, it is usually furnished with a base containing a coolant system and an electrical control panel. A battery of these small machines can be mounted on a long bench with one central coolant system. One feature of the machine is the fact that it is vertical, giving the operator full visibility of the work gear at all times. Another feature is that the machine is so arranged that the work gear when being loaded has some backlash when in mesh with the cutter. When the machine starts its cycle, the backlash is automatically taken up.

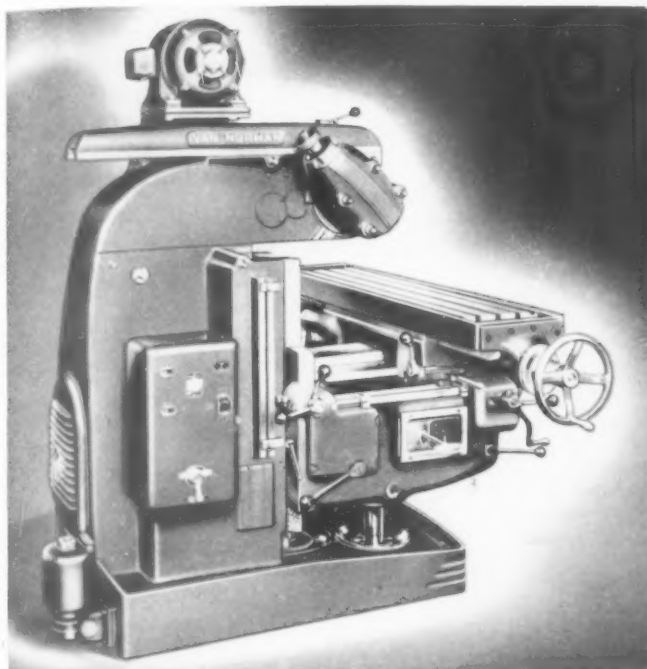
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons — page 155.

NEW CONTROL STATION SWITCH (J11)

Positive snap-action is claimed of the new control station switch being manufactured by the Electrical Manufacturing Division of The National Acme
(Continued on page 162)

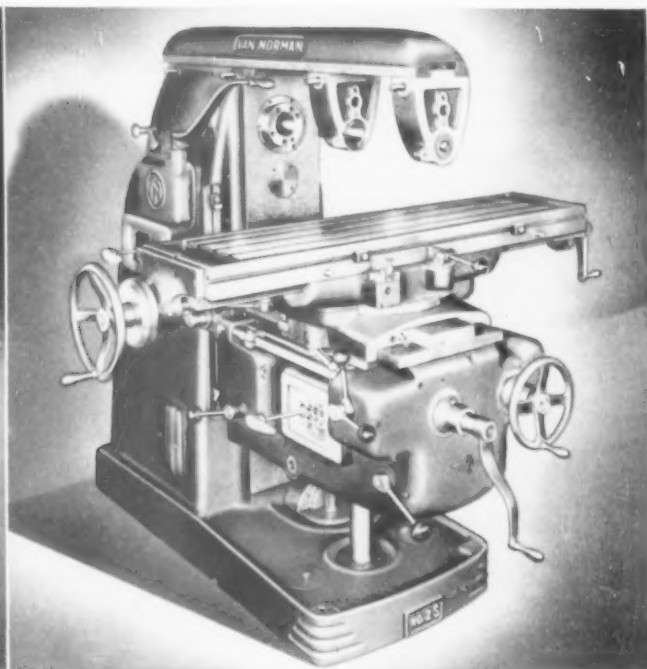
Tools of Peace are now WEAPONS OF WAR



NO. 26 RAM-TYPE MILLER

Table: 50" x 12"

Range: 28" longitudinal, 12" cross, 18" vertical



NO. 2-S HORIZONTAL MILLER

Plain and Universal

Table: 50" x 12"

THE VAN NORMAN LINE OF MILLING MACHINES needed no redesign for wartime operations . . . and they have required no radical changes since. For more than 50 years of development had given these precision tools the highest adaptability to the most exacting requirements for speed and accuracy that could be imposed either in peace or war. Today, Van Norman Vertical, Horizontal, Ram-Type, Contour and Hand

Millers are helping to keep vital war work up to . . . and in many cases, *ahead of* . . . schedules in key production plants of all the United Nations. They are making it possible to turn out quality work in unprecedented quantity because of their extreme ease of operation and control, which not only saves time for skilled operators, but also helps new operators to learn their jobs more quickly.

VAN NORMAN MACHINE TOOL CO., SPRINGFIELD, MASS.

Van Norman MILLING MACHINES

In June, 1942, Van Norman was awarded the Army and



Navy E in recognition of its war production record

Company, Cleveland, Ohio. Called "Snap-Lock", this new mechanism is said to make a partly open-partly closed position impossible thus reducing to a minimum the dangers from arcing.

Readily adaptable to multiple assembly for use in connection with magnetic motor starters or any normal control circuit, this mechanism has standard assemblies of 3, 2, or 1 button combinations. These units may be arranged in combinations to produce control station assemblies that will handle as wide a variety of functions as may be re-

quired. The snap make and break of contacts and the positive locking in either position are safe-guarded by spring pressure and hardened steel cadmium coated parts.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

Rehnberg-Jacobson AUTOMATIC INDEX UNITS

SIZES

16"

20"

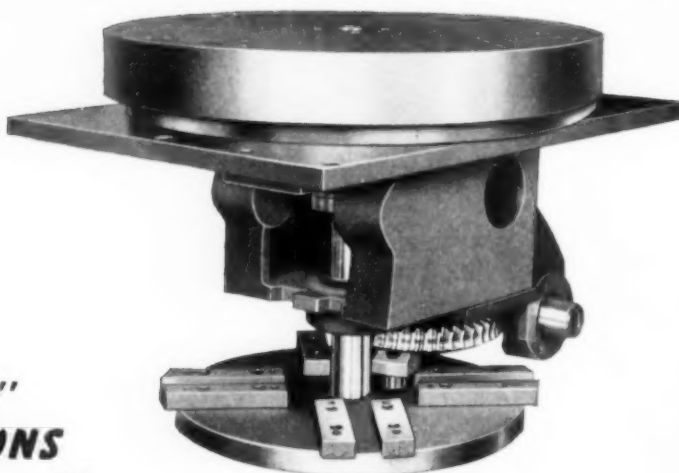
24"

30"

36"

POSITIONS

4 TO 16



COMPLETE MOTOR-DRIVEN INDEXING TABLES, READY FOR INSTALLATION

These units are designed to be mounted, through a hole of suitable diameter, in any machine base. The operating mechanism is a modified geneva stop motion driven, through a worm and worm gear, by a brake-type motor which starts and stops for each index. At each position a nitrided locking pin is raised by a cam to hold the table accurately and positively. A lifting device may be included to elevate the table slightly during index to reduce wear on bearing surfaces. In addition, an optional friction drive is available to prevent damage from interference when the table is in motion.

These tables, together with our Drilling or Tapping Units, can be combined on suitable bases to develop specialized automatic production machines.



Write for Circular E-5

REHNBERG-JACOBSON MFG. CO.

Special Machinery

2137 KISHWAUKEE ST. • ROCKFORD, ILLINOIS



National Acme's New Control Switch
Positive snap-action is claimed.

NEW LOGAN TURRET LATHE

(J12)

A new hand screw machine which has a capacity of $\frac{5}{8}$ inch round bar stock has been recently introduced by the Logan Engineering Company, 4901 Lawrence Avenue, Chicago. Some of the features of design and construction of this new lathe include: precision ground bed with two prismatic "V" ways and two flat ways; precision, pre-loaded ball bearing spindle mounting; turret holes that are bored from the headstock; and



Logan's New Hand Screw Machine
Capacity: $\frac{5}{8}$ inch round bar stock.

turret and cross slide that are provided with adjustable gibs to compensate for wear.

Accessories offered include a new speed collet chuck for handling round work which may be fed through the spindle and a bar feed attachment. It is claimed that this lathe releases larger machines for heavier work since it can turn out small parts from bar stock of $\frac{5}{8}$ inch diameter or smaller at the same speed and accuracy as the larger machines.

(Continued on page 164)

4 TIMELY HELPS

for Your ALL-OUT Production Program

to help you select the right tool steel for each tool



Here is a quick reference manual for the tool engineer and tool designer. "The Carpenter Matched Tool Steel Manual" provides an 80-page Tool Steel Selector alphabetically indexed by kinds of tools. Flip the pages and it guides you to the steel that best meets the requirements for each tool.

Also contains accurate and complete heat treating instructions on each of the Carpenter Matched Tool Steels. It can help you save time and materials—and get the most out of every pound of tool steel.

how to check the identity of tool steel



For quick identification of mixed stock...for checking identity of the steel before heat treating tools...here is a ready reference guide for training men in spark testing. This wall chart (21" x 30") clearly identifies the spark of each of the Carpenter Matched Tool Steels. It provides information on spark characteristics caused by the major alloys. With it as a guide, men can be trained to quickly identify different types of tool steels.

how to get the most out of this oil-hardening tool steel



If you are interested in knowing about *Stentor* Oil-Hardening Tool Steel that is saving time and helping to avoid trouble in many tool rooms, write for our bulletin, "How to Get the Most Out of *Stentor* Oil-Hardening Tool Steel". It contains simple heat treating instructions which save experimenting by clearly defining hardening procedure for best results.

Also has information on safety in hardening, holding size, hardening without soft skin, and detailed data on *Stentor*—the old standby that is insuring better tool performance wherever it is in use.

to help you speed up training of tool and die makers



Training skilled labor in the shortest possible time is just about the "number one" problem facing war industry today. Here is the handbook around which many plants have built their training programs. Every man you want to train for your tool room can get practical knowledge from it. It is written in simple language, free from technical terms. Covers tool

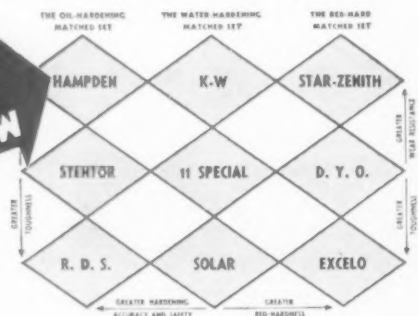
design, heat treating, quenching, testing, analysis, trouble shooting, etc. 315 pages, 205 illustrations. Available at cost—\$1.00 per copy in the U. S.—\$3.50 elsewhere. Order as many as you need today.

This useful tool steel information can help you solve your war production problems. We will be glad to send you copies of any or all that you desire. Write us today on your company letterhead. The handbook, "Tool Steel Simplified," is available in any quantity in the U. S. A. at cost—\$1.00 a copy (\$3.50 elsewhere). The other literature is free to tool steel users in the U. S. A.

THE CARPENTER STEEL COMPANY, 122 BERN STREET, READING, PA.

Carpenter
MATCHED
TOOL STEELS

IMPORTANT,
BEFORE...
VITAL NOW



**AUTOMATIC
ARC WELDING**

(J13)

Said to be particularly suited to work where one or more complete joints can be made with a single electrode as in the welding of shells, wheels, and tubular assemblies where the starting and finishing ends of a single weld bead overlap, this new equipment for automatic arc welding has recently been announced by the General Electric Company of Schenectady, N. Y.

For use with heavily coated electrodes in cut lengths, the essential ele-

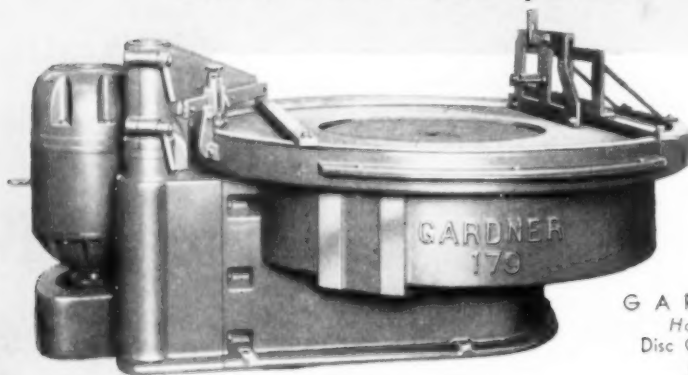
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons — page 155.

ments of this equipment have also been made available in order that automatic arc welding heads originally designed for operation with thyatron-controlled coiled electrodes can be converted for successful welding with stick electrodes.

This new equipment is said to have been used to make edge, lap, fillet, and groove welds. Among the applications are the welding of machine gun water jackets, tank wheels, ordnance shells, and refrigerator parts. A clamp holds

*Handles larger-than-ordinary
flat surface jobs!*



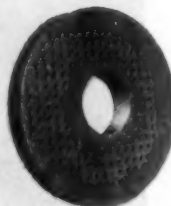
GARDNER
Horizontal
Disc Grinders —
NOW
available
in 84" size!

THE great versatility — the exceptionally wide work-range — of the standard 53" and 72" Gardner Horizontal Disc Grinders, have led to their almost universal adoption for quickly generating flat surfaces on large work.

Now an 84" machine is available — the largest of this type ever built. Carrying a heavy-duty Gardner WIRE-LOK Abrasive Disc, this tool is capable of handling large bases, gun mount parts, or any similar pieces of unusual size requiring a good, flat surface.

If your castings are larger than ordinary — if your present machining costs are running too high — investigate this 84" Gardner Grinder.

Write for descriptive bulletin!



Use Modern
GARDNER
WIRE-LOK
Abrasive
Discs on Your
Disc Grinders!

GARDNER MACHINE COMPANY

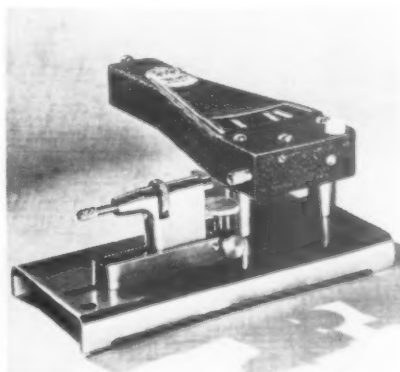
442 East Gardner Street

Beloit, Wisconsin, U. S. A.



G.E.'S Automatic Arc Welding Equipment
Uses coated electrodes in cut lengths.

any standard stick electrode and transmits the current to the electrode. This clamp is attached to the end of a feed rod upon which two feed rolls operate to maintain the proper arc voltage. The electrode is guided to maintain the arc in a predetermined location. The extremes of movement in either direction are governed by limit switches.



Trico's New Comparator Type Gage
Fitted with an adjustable anvil.

**COMPARATOR
TYPE GAGE**

(J14)

Originally designed for inspection on precision parts, this device, called the "Micro-Chek" and manufactured by the (Continued on page 166)

THE EASTERN WAY IS THE AMERICAN WAY

★ The dominant thought in America today is *to win the war!* Today, tomorrow, and for some time to come, *CONSERVATION* and the careful maintenance of existing equipment, machinery — and particularly tools — is a “*must*” in every plant.



HIGH Speed Tools of all descriptions, Files, Pneumatic Tools, etc., are bullets on the Battle Line of Production. The demand for reconditioning these tools has been so great — and the need for production speed

has been so intense — in tune with the war effort, that this fact affords us an opportunity to say that the *Eastern Way is the American Way* of reducing tool costs and achieving more efficient production.

MORE THAN 30 YEARS' EXPERIENCE IN TOOL RECONDITIONING

A COMPLETE RECONDITIONING SERVICE FOR TOOLS



EASTERN CUTTER SALVAGE CORPORATION, 30-32 LITTLETON AVE., NEWARK, N. J.

Western Plant • MASTER TOOL CO., INC., 5605 HERMAN AVE., N. W., CLEVELAND, OHIO

Chrome Plant • MASTER CHROME SERVICE, INC., 5709 HERMAN AVE., N. W., CLEVELAND, OHIO



Trico Products Corporation of Buffalo, N. Y., has now been developed to use a simple mechanism of levers to multiply the dimensions and to put this multiplying device under the control of a push button. It is a comparator type of gage which is set by the use of two master parts, one having the limit of dimensional tolerance on the high side and the other having the dimensional tolerance on the low side.

Production parts may be compared to the master part for its "go" and "no go" limits simultaneously through the setting of two limiting fingers on the in-

strument. The accompanying illustration shows the "Micro-Chek" mounted on a universal base, fitted with an adjustable anvil. Users may build their own anvil or the manufacturer can furnish one with the instrument.

UNIVERSAL 3-WAY VISE

(J15)

Holding work rigidly for milling, drilling, boring, reaming, grinding, shaping, die sinking, checking, and other machine tool operations involving single or compound angles is said to be the main feature of a vise manufactured

by the Universal Vise and Tool Company of Parma, Michigan. Said to be fully portable, it has two large lugs on the base for rigid bolting and may be moved from machine to machine without removing the work or altering the work angle.



Universal's New 3-Way Vise
Work angle same when moved.

Said to replace many special fixtures, the vise jaw plates are interchangeable and three separate motions are provided by the double swing cradles, each allowing 90 degrees adjustment, and a full swiveling base that allows 360 degrees rotation. Said to be ideal for grinding complex toolbit shapes and for milling tool blanks for carbide inserts, this vise has a jaw opening of 5 inches, weight of 70 pounds, and wedge locks that are 2,000 pounds torque tested.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

HEAT-TREATING FURNACE

(J16)

This specially built, large heat-treating furnace was recently designed and constructed for a large war plant by the Johnson Gas Appliance Company of Cedar Rapids, Iowa. Said to maintain a temperature of 2000 degrees F. for constant operation, this new unit's inside combustion chamber measures 36 inches wide, 30 inches high, and 60 inches long. It is lined with 5½ inch insulation and faced with 4½ inch in-

(Continued on page 168)

TO MACHINISTS USING McCROSKY SUPER REAMERS*

Know Your Weapon
AS WELL AS
He Knows His

WHATEVER his combat branch, the American soldier, sailor or marine knows his weapon from A to Z. He knows exactly what his rifle or machine-gun or artillery piece will do, how to maintain it at peak efficiency, how to take it apart and put it together again under the most adverse conditions. IF a McCrosky Super Reamer is one of your weapons in this war, you'll be

helping your plant's production and Uncle Sam by knowing that weapon from drive slot to cutting edge, by knowing how to keep that weapon in "fighting trim."

There's a free new McCrosky Reamer Manual to help you be an expert with your weapon. In short, simple language, this illustrated manual covers the basic principles of the inserted-blade reamer, the fundamentals of reamer grinding and maintenance. It will help you do top work and at the same time insure the maximum efficiency and long life of the tool.

WRITE
NOW
FOR



McCROSKY REAMER MANUAL



Increase "Eye Efficiency" with STANLEY "FLUD-LITE" MAGNIFIERS



Floodlights the work area with glare-free fluorescent light.

Magnification prevents eye-strain and lessens worker fatigue.

Saves man-hours, speeds production.

Reveals the finest details.

SPEED UP INSPECTION... ASSEMBLIES

Those time-consuming, eye-fatiguing jobs can now be speeded up to meet today's demand for record production... with Stanley "Flud-Lite" Magnifiers. A flood of "natural" light on the work, plus the high quality 5" diameter lens, increases the "eye efficiency" of inspectors, assemblers, machinists and toolmakers. The tiniest cracks, scratches, and other flaws in machined parts are quickly revealed. Reamers, gauges, punches, dies, etc., can be checked at a glance.



THE FLUORESCENT DAYLIGHT LAMP

illuminates every detail of the work with shadow-free natural light. It generates little heat, and its current consumption is very low. Operates from any 110-120 volt A.C. outlet.

The "Flud-Lite" Magnifier is also an invaluable aid in map making and reading, engraving, counterfeit detection, fingerprint inspection, and other work where magnification is required. Men and women who can see better do better and faster work.



No. 701, above, is the bench type "Flud-Lite" Magnifier. Swivel joints permit adjustment to any desired position. Base is removable to allow permanent attachment in any location.

Ask your Stanley Distributor about "Flud-Lite" Magnifiers. Literature sent on request. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

No. 701H, at the right, is the portable type "Flud-Lite" Magnifier. It permits inspection anywhere in the plant, inside machines, and other hard-to-reach places. Fitted with a comfortable grip, hardwood handle and six feet of approved cable.



STANLEY

Electric Tools

ulating refractory.

An electrically operated door that raises in 5 seconds and stops automatically is one of the features of this furnace. Other features include a proportioning-type control which automatically

regulates furnace temperature and stack damper position plus a push-button electric ignition that lights burners. This large furnace was in operation 49 days after the idea was conceived to meet the demands of this specific heat-treating problem.

INFORMATION FREE

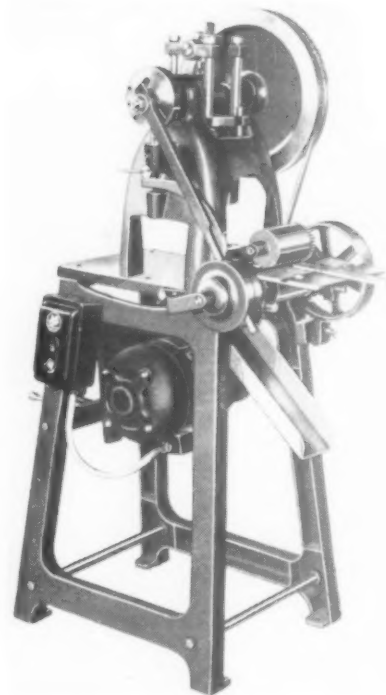
For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

AUTOMATIC PRESS

(J17)

Changes and improvements have been recently made on the high speed automatic press manufactured by the Di Machine Corporation, 3651 Lincoln Avenue, Chicago. Among the new fea-

tures of this machine is the variable speed control which is said to allow 100



Di Machine's Automatic Press
180 to 550 strokes per minute claimed.

to 550 strokes per minute to suit the type of work to be done. It has a variable speed drive with 1140 rpm, 220 volt, 60 cycle, 3 phase motor.

To accommodate existing die equipment, die space may be increased to 5 1/4 inches with riser blocks as shown provided as additional equipment. The ram can be bored out to receive shanks up to 1 9/16 in. diameter. The machine has a cast iron stand and takes a floor space 20 by 32 inches with an overall height of 54 inches. It is claimed that the feed mechanism can be engaged or disengaged instantaneously without stopping the press.

UNIVERSAL VISE

(J18)

This new universal vise recently introduced by Mohr Lino-Saw Company, 122 North Union Avenue, Chicago, employs the cam principle to grip the work. It consists of a base and a bushing plate mounted on leader pins having collars at their lower ends through which the cam shaft passes. The bushing plate raises 1/4 inch when the handle is raised 90 degrees. It is said to have a compression ratio of 1 to 40.

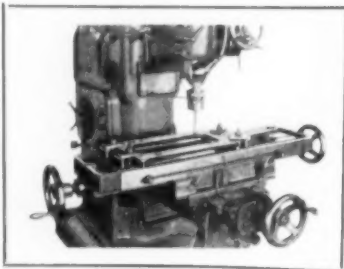
This new unit gives the tool designer a complete jig body and clamping unit, the nest and bushing plate are the only parts to be designed. It is said to be quickly converted for the production of

(Continued on page 170)

THE

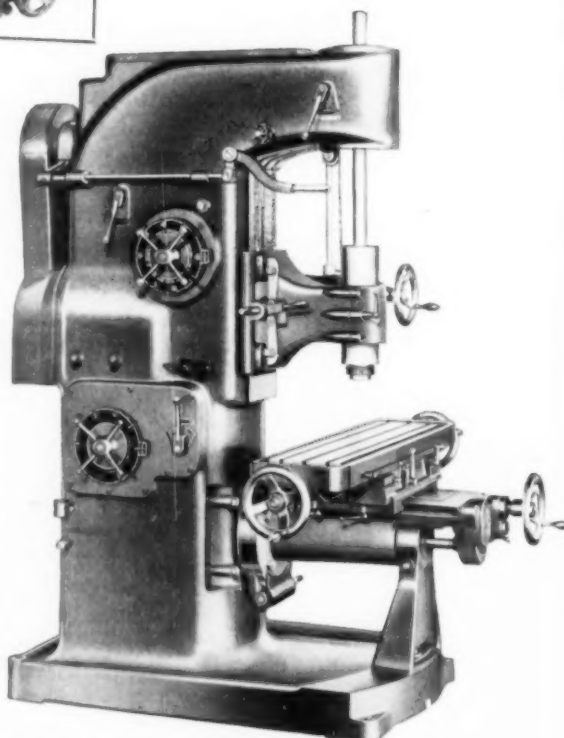
KNIGHT MILLER

has Ability to Produce!



**Even Difficult Set-Ups
Made in a Short Time
With This Machine!**

The great capacity of the KNIGHT MILLER is shown by the milling and boring of this template which was four inches longer than the table travel! These milling machines will perform and produce, at any of their speeds and feeds, to the full capacity of the motor installed, and the capacity of each machine is only limited by power output of the motor recommended. There are 16 changes of speed in either direction, 4 vertical spindle feed changes and 16 table feeds in either direction.

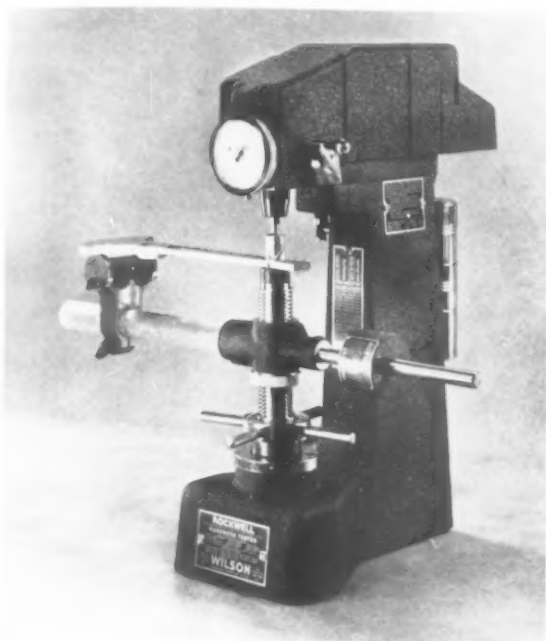


Write Today For Our Catalog

W. B. KNIGHT MACHINERY CO.

3920 WEST PINE
SAINT LOUIS, MO.

**"ROCKWELL"
HARDNESS TESTER**



Millions of different shapes and sizes of pieces have been successfully tested in our machines.



WILSON
MECHANICAL INSTRUMENT CO. INC.
NEW YORK

NOVEMBER, 1942

WELDON ROBERTS
Brightboy
REG. U.S. PAT. OFF.

**A NEW HIGH
IN FINISHING SPEED!**



Brightboy Wheel smoothing and polishing aluminum part. Edges and holes de-burred in one operation.

Part clamped in press being finished by contact with Brightboy Hand Tab.

"The Soft Rubber Binder Cushions The Abrasive"

FINISHING speed-ups, frequently combining a number of operations, are being achieved by BRIGHTBOY.

Brightboy bridges the gap between a grind and a buff. Because its abrasive is rubber cushioned, it produces a finish at substantial savings in operation and labor. Works on all metals — alclad, dural, aluminum, steel, copper, brass.

Brightboy wheels can de-burr, polish and put on a slight radius in one operation. Brightboy blocks and special shapes have innumerable applications for manual and drill press work, especially for close-tolerance jobs.

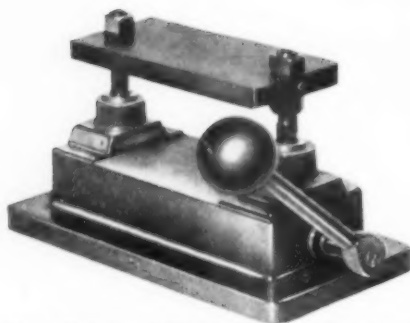
Available to war industries through recognized mill supply dealers. Brightboy field men are at your service. Write today for catalogs and prices if your dealer cannot supply you.

BRIGHTBOY INDUSTRIAL DIVISION

WELDON ROBERTS RUBBER CO., NEWARK, N. J.
U.S.A.



1. Removes light digs, tool and heat marks.
2. Cleans welded and soldered joints.
3. Finishes dies.
4. De-burrs light stampings and machined parts.



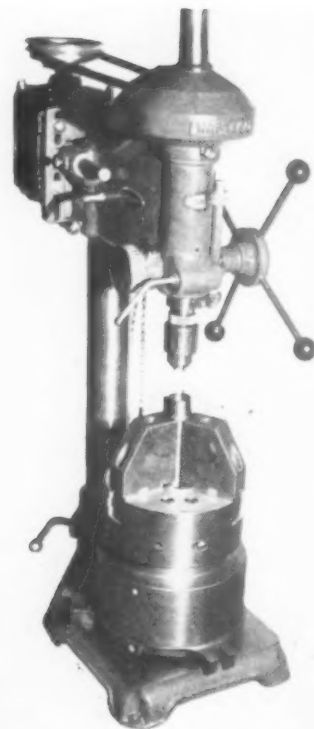
New Universal Vise by Mohr Lino-Saw
Uses cam principle to grip the work.

many different kinds of parts by changing only the drill bushing plate and adapter.

AIR OPERATED CHUCKING DEVICE (J19)

Through the use of new air cylinders and air operated chucking devices manufactured by the Anker-Holth Manufacturing Company, Chicago, drill presses, lathes, and vertical milling machines are said to be quickly converted into production machines.

The accompanying illustration shows a drill press which has been equipped



Drill Press Equipped With New Chuck
Has 3 jaws, includes air cylinder.

with a combination air cylinder and air operated, three jaw, universal chuck made by this concern. In this case it is being used for performing all internal machining operations on 40 mm., M 48, high-explosive shells. This company is making these combinations in sizes from 37 mm., to and including 105 mm.

Outwearing Other Material 2 to 1!

● Hearing of their outstanding performance in other plants, this metal working plant installed a trial set of "Ampco" bronze guide pin bushings. After Ampco Metal had been in service one year, it had out worn previous material two to one.



AMPCO
gave longer life—more
economical service

Die sets often operate at extremely high speed — open, close; open, close—thousands of cycles hourly—millions yearly—yet the guide pin bushings that control accuracy in this process must never vary—must resist wear and maintain alignment. Here Ampco Metal again proves its merit.

Perhaps Ampco Metal costs a trifle more, but the increased life of the parts made from the alloy proves its economy. It outwears other metals — gives a fuller measure of value. The ultimate cost is always low.

Detailed information concerning Ampco Metal will be sent on request.

AMPCO METAL, INC.

DEPARTMENT TE-11

MILWAUKEE, WISCONSIN

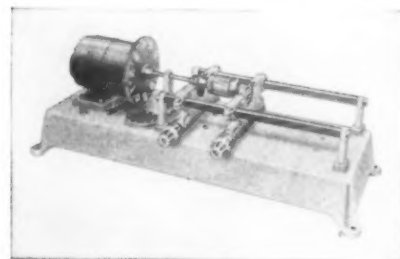
AMPCO

METAL

THE METAL WITHOUT AN EQUAL

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons —page 155.



New Bear Dy-Namic Balancing Machine
Said to eliminate static balancing.

NEW DY-NAMIC BALANCERS (J20)

With the new dy-namic balancing machines manufactured by The Bear Manufacturing Company, Industrial Division of Rock Island, Illinois, it is said to be unnecessary to static balance before the
(Continued on page 172)

**WITH PRODUCTION
UP TEN-FOLD**

**DELIVERIES
ARE PROMPT**
(and we mean prompt)

... a real achievement for

MILFORD PROFILE SAW

... today's choice for ALL
contour-sawing, jig and
band saw machines.

Yes, our production today is ten times more than it was in pre-war days. Added manufacturing equipment has made it possible for us to accept and fill huge war production contracts, as well as a greatly increased industrial demand, and still maintain our stocks and make fast deliveries.

So you can order MILFORD PROFILE SAW with confidence . . . confidence in its quality, as guaranteed by the world's largest producer of metal cutting band saw . . . confidence that you'll get it when you need it.

Order from your Mill Supply Distributor

If you haven't yet adapted your band saw machines to Profile Sawing, write us for directions. Include specifications of machines and cutting jobs you'd like to do on them.

THE HENRY G. THOMPSON & SON COMPANY
NEW HAVEN, CONNECTICUT
Also makers of MILFORD REZISTOR HACKSAW BLADES

NOVEMBER, 1942

Hammond OF KALAMAZOO NEW 20" WHEEL WET TOOL GRINDER FOR LARGER CARBIDE AND OTHER TOOLS



Tilting table for carbide tool grinding optional.

Outstanding features!

- (1) New improved combination tool rest and wheel dresser.
- (2) Tilting table for carbide tool grinding (optional).
- (3) Circulating coolant system features sliding and tilting deflector.
- (4) Large sludge pan 24" wide x 35½" long, 8" deep has removable splash guard (shown in phantom) adds protection, aids cleaning.
- (5) Heavy ribs and cross sections for Vibrationless operation.
- (6) 20" diameter x 2½" face grinding wheel furnished.
- (7) Oversize spindle, V-belt driven.
- (8) Constant level oiler.

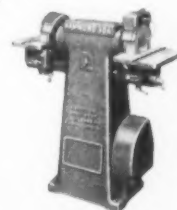
WRITE FOR BULLETIN 101



Hammond 10 and 14
Wet or Dry Carbide
Grinder



Hammond Combination
Chip Breaker Grinder



Hammond 10-A
Dry Carbide Grinder

Hammond Machinery Builders
INC.

★ ★ ★

1636 DOUGLAS AVENUE

★ ★ ★

KALAMAZOO • MICHIGAN

Eastern Branch — 71 West 23rd Street, New York, N. Y.

171

dynamic balance tests are made. It is claimed that the machine reveals whether a static or dynamic unbalance, or both, are present without reversing the ends of the object being tested.

The machine indicates the disturbing centrifugal force or force couple, showing both the angular position and the value or amount of unbalance at the same time. Handling such rotating parts as armatures, fans, blowers, fly-wheels, propellers, gears, and impellers weighing from 6 ounces to 1000 pounds, these balancing machines are available in a

variety of models ranging from bench models to large floor and pit-type models.

The accompanying illustration shows the new Bear bench model 335 for the dynamic balancing of small rotating

INFORMATION FREE

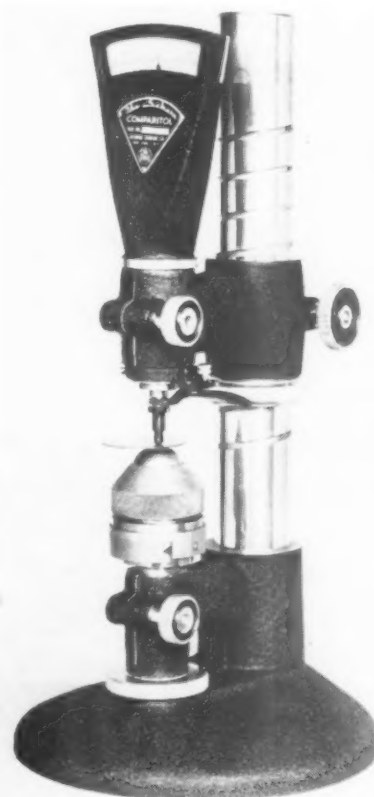
For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.

parts weighing from 6 ounces to 20 pounds.

SPECIAL MEASURING ANVIL

(J21)

Where the measuring of extremely thin work is necessary this new ball measuring anvil; just developed by the George Scherr Company, Inc., 132 Lafayette Street, New York, for their Comparitol, is said to solve the problem. Crystals, laminations, shims, extremely small gages, and other flat work can be accurately inspected by this set-up it is claimed.



George Scherr's Comparitol Has new ball measuring anvil.

The work is placed between the flat feeler point and the round ball surface thus the danger of bending the work out of size a few thousandths due to the measuring pressure is eliminated.

The fact that the flatness or parallelism of long thin pieces may be checked with the instrument which incorporates this ball anvil, is said to be an outstanding feature. The column of the instrument has an index line so that the ball point and the feeler point can be lined up from left to right as to center distance.

FLUX FOR GAS WELDING

(J22)

Said to be widely employed in the (Continued on page 174)



ALL-PURPOSE
MOTORS
.....
TOTALLY-ENCLOSED
MOTORS
.....
EXPLOSION-PROOF
MOTORS
.....
FLANGED TYPE
MOTORS
.....
GEARHEAD
MOTORS
.....
SPECIAL TYPES
BUILT TO
SPECIFICATIONS
.....
BUILT-IN
MOTORS
.....
LIMA GEARSHIFT
DRIVES

Yes! We can furnish the motors you need immediately if you have or can get the proper priority.

LIMA Standard Electric Motors are built in a large range of types, in sizes from 1/2 to 75 H.P. brake test. The LIMA line includes Built-In Motors to your specifications as well as many special types for applications not covered by the standard line. Consult our engineers regarding your motor requirements. Years of experience with standard and special motor applications constitute the background of our organization... this experience we offer in solving your motor problems.

LIMA Electric Motors with their many features, high quality workmanship and materials are your answer to today's need for motors with *stability and endurance*.

Write or wire us today for literature. Prompt attention to inquiries... **QUICK DELIVERY** on orders,

Large enough to successfully serve you,
yet small enough to give personal attention to your needs.



DRIP-PROOF
1 to 75 HP

THE LIMA ELECTRIC MOTOR CO.

OFFICES - NEW YORK - CHICAGO - DETROIT

LIMA, O. U. S. A.

EXPLOSION-PROOF
1 to 5 HP

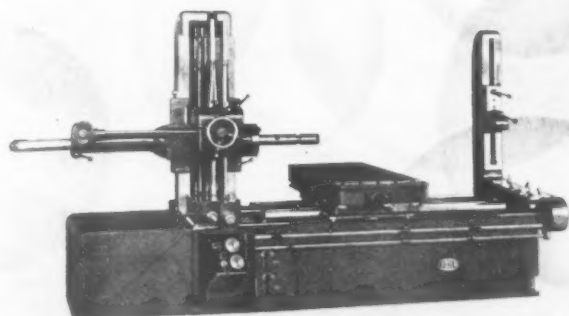
POLISHING LATHES

OPEN

VERTICAL

TOTALLY-ENCLOSED

New Advanced Design
Yoder ^{N.O.} **3A** HORIZONTAL
 BORING
 MILL



YODER POWER TOUCH CONTROL...

A convenient central control station. Versatile in its quick starting and stopping, speed adjustment without stopping and correct speed setting.

YODER POWER FLOW DRIVE...

The full advantage of a D.C. Drive (from A.C. power source) such as rapid acceleration up to predetermined speed settings, quick shockless stops and starts, infinite speed adjustments.

YODER PLUS OTHER FEATURES...

A two-speed rapid traverse facilitates inching up to the work at a slow rate and at a high rate when considerable travel must be made. Main drive for spindle is direct from a motor, while the feed drive is from another motor through positive clutch drive.

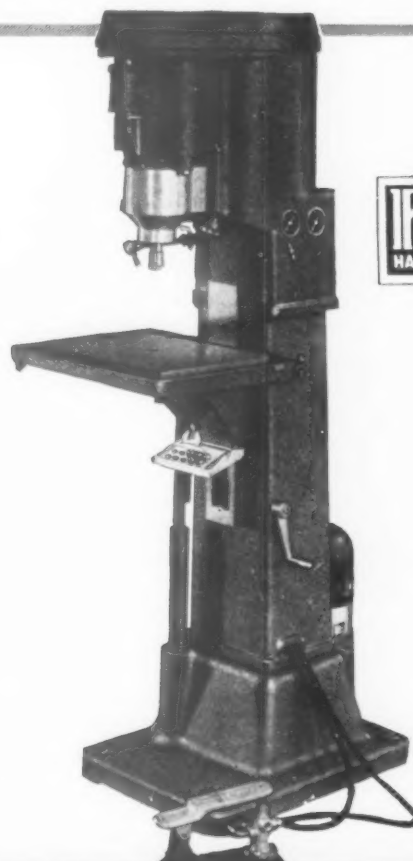
Heavy multiple thread gear on the spindle drive eliminates all noise and chatter. All drive shafts, drive and feed gears, are of the best alloy steels obtainable, mounted on anti-friction bearings and provided with oil pump flood lubrication. And many more desirable features! Write for the late bulletin for full description.

Buy War Bonds

The YODER ^{ENGINEERING} _{MANUFACTURING} **SALES COMPANY**
 CLEVELAND, OHIO



**What the man
who looks ahead
 thinks about tapping**



HASKINS *Precision*
TAPPING
EQUIPMENT

• The man who looks ahead knows that someday he will have to switch back from war-time to peace-time production. That is why he demands versatile tapping equipment of lasting value. That is why so many men who look ahead are buying Haskins Tappers. These standard machines can quickly and inexpensively be set up for the new jobs ahead. They will continue to bring lower costs per man and machine hour long after Victory is won! R. G. Haskins Company, 2756 W. Flournoy St., Chicago.

ARE YOUR AUTOMATICS OVERLOADED?

Many tapping operations, once handled on screw machines, are now performed faster, better and at lower cost as *second* operations on Haskins Tappers. Write for complete details of this money-saving way to speed production.

NEW BOOKLET—"Holding Fixtures for Haskins Tapping Machines"—contains many new ideas. Send for a copy.

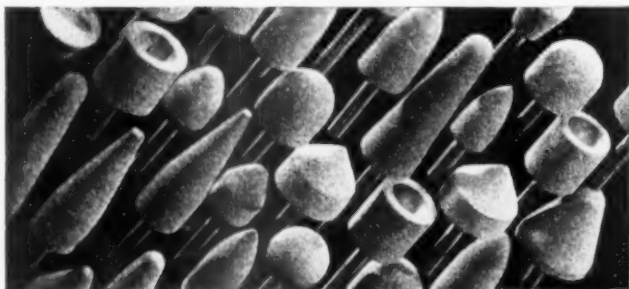
aviation industry, a new free-flowing flux for the gas welding of aluminum and aluminum alloys is now manufactured by Park Stewart, 1058 Carbis Street, Worthington, Pa. Given the trade name of "Flo-Ez-Flux", this flux is claimed not to solidify or deteriorate.

This new material is being used to gas weld wrought, cast, or high tensile aluminum or aluminum alloys of any size or shape where welding is possible, it is said. Packaged in a glass container to prevent corrosion and protect the flux from moisture, this ma-



New Flux for Gas Welding
Used with aluminum & aluminum alloys.

POLISH 'EM OFF WITH



They're TOUGH and DO Their STUFF!

Commandos of the grinding wheel industry — the first small wheels mounted on steelshanks and leading the way today with smoother, more rapid grinding, polishing and finishing of difficult jobs.

Chicago Mounted Wheels — the result of 45 years of KNOW HOW — come in a wide range of styles on different size shanks, for use with any portable or flexible shaft grinder. Several special-formula abrasives give 150% to 300% longer service. More than 200 shapes, all mounted and ready to go.

HI-POWER GRINDER

A real production tool — a 3-pounder with enough power to drive a 2½" diameter wheel. 17,000 r.p.m. In case with accessories, \$38.50.

LATEST CATALOG Packed full of comprehensive information and pictures. You'll be interested. Send for copy.

CHICAGO WHEEL & MFG. CO.
Makers of Quality Products Since 1896
1101 W. Monroe St., Dept. TE, Chicago, Ill.

TEST WHEEL FREE

If you have a grinding problem, send for a Survey blank, which you'll find easy to fill out. Upon its return, our abrasive engineers will analyze it and send you without charge the trial wheel they recommend for your particular job.

<input type="checkbox"/> Send Hi-Power	<input type="checkbox"/> Catalog	TE-11
<input type="checkbox"/> Free Wheel	Size	
Name		
Address		

terial is available in variety of sizes ranging from ¼ to 25 pounds.

NEW L-CLAMP

(J23)

Said to be an entirely new design in clamps, this clamp is being manufactured by Knu-Vise, Inc., 2204 Eighth Street, Detroit. Claimed to be very practical in limited spaces or where large throat capacity is necessary, the design of this clamp resulted from a need in aircraft construction for some device to hold L-sections more satisfactorily.



New L-Clamp by Knu-Vise
Has large throat capacity.

The handles of the clamp are constructed at right angles to the clamping position. Another feature is the fact that this clamp can be placed in any position and not project out into space to act as an obstruction. Both the slipping of the clamps and the marring of highly polished surfaces are said to be prevented by the use of rubber caps on the contact places.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons — page 155.

PORTABLE GRINDERS

(J24)

Two new portable grinders, called the "AD" and the "AE" with 4 and 5 inch grinding wheels respectively, have been recently announced by Skilsaw, Inc., of Chicago. Said to contain many features of advance design, they have ball bearings mounted in steel inserts on the armature and the extreme ends of the wheel spindle to absorb thrust, eliminate vibration, and insure cool operation.

Claimed to meet today's high speed
(Continued on page 176)

The REED Policy of PLANT EXPANSION

*Increased Production
Simplification of Models*

These 4 Simplified Types
TO MEET TODAY'S DEMAND for micrometers, the REED factory is temporarily devoting its entire production to the following four models.



No. 801 plain, reading to 1/1000".
Price \$6.25 list



No. 901 plain with vernier reading to 1/10,000".
Price \$10.25 list

Two Types of Two Inch REED MICROMETERS Now Available



No. 802 plain, reading to 1/1000".
Price \$7.00 list



No. 802 plain with vernier reading to 1/10,000".
Price \$8.75 list

Note: For the time being, no lock-nut ratchet micrometers are being manufactured



is aiding us to deliver micrometers to plants that can furnish preference ratings and to mechanics who can fill in our simple form proving that they are working on war production.

Four Reasons for the Increasing Popularity of REED Micrometers.

1. Lead accuracy over the full range of the screw is within a fraction of 1/10000" due to REED'S exclusive process used in forming the micrometer thread. This process makes variations virtually impossible.
2. Longer life of the micrometer screw due to a burnishing process which compresses the surface of the thread making the steel more dense, resulting in greater resistance to wear.
3. Easy reading graduations on thimble and vernier due to freedom from glare and reflection.
4. Fine, sensitive touch because of the smoothness and accuracy of the thread over its full length.

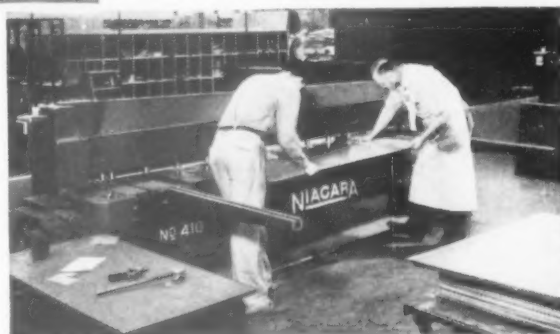
Write today for literature describing the simplified types of REED Micrometers now being produced in ever increasing volume.

GEORGE SCHERR CO. 132 Lafayette St.
New York, N. Y.



Niagara Power Squaring Shears are built in a complete range of sizes up to 20 foot cutting lengths. Complete specifications available by writing Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: General Motors Bldg., Detroit; Leader Bldg., Cleveland; 50 Church St., New York.

Production of America's largest transport planes and big bombers as well as fighters is being speeded up by batteries of Niagara Power Squaring Shears. Cutting accuracy heretofore unobtainable is made possible by the modern design of Niagara shears. Quick setting gages self measuring to increments of 1/128 inch, flat cutting of narrow strips, drive mechanism enclosed in oiltight case, instant acting sleeve clutch and full visibility of cutting line are just a few of the many Niagara features.



requirements on grinding, wire brushing, polishing, and buffing operations, these new grinders have the commutator and switch fully enclosed for protection against dust. Other features include straight-line ventilation to blow dirt away from the operator and prevent clogging, gears that are heat-treated and spline-mounted on shafts, and a universal motor.

The model "AD" portable grinder is 22 inches long, weighs 15 pounds, operates at no-load speed of 4500 rpm, and drives a grinding wheel 4 inches by $\frac{3}{4}$

inch by $\frac{1}{2}$ inch. The "AE" model operates at 4200 rpm, has a grinding wheel 5 inches by $\frac{3}{4}$ inch by $\frac{1}{2}$ inch, weighs 18 pounds, and is $22\frac{5}{8}$ inches long.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 155.



4 $\frac{15}{16}$ " lathe
Sliding Cluster Gear

IT'S MADE OUT OF
SPEED TREAT STEEL
A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

—because . . .

- Speed Treat increased production 53%
- Speed Treat improved flame hardening on teeth
- Speed Treat reduced scrap loss 75%
- Speed Treat broached without tearing
- Speed Treat saved \$65.00 per ton of steel used

Ductility
Plus
Machinability
(170 SFPM)

In this "all-out" war effort Monarch Steel is co-operating 100%.
We're helping to "keep 'em rolling" with Speed Treat Steel.

Licensor
MONARCH STEEL COMPANY
HAMMOND • INDIANAPOLIS • CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

Licensor for Eastern States
THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

DOUBLE-END GRINDER

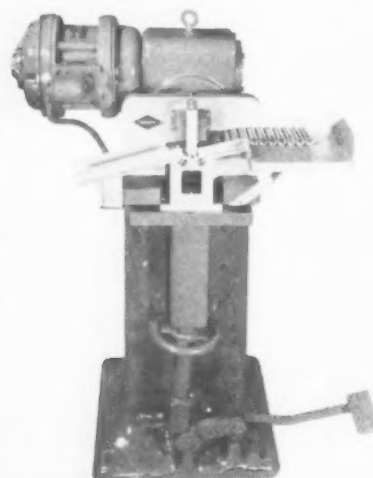
(J25)

Said to incorporate recent improvements for the free hand grinding of tungsten carbide tipped tools and other types of tool bits, this new double-end grinder has just been announced by Willey's Carbide Tool Company of Detroit. Furnished with coolant pump and pan for wet grinding, this new machine is said to have a motor of special design which is available for 220 or 440 volts and is 60 cycle, three phase, and operates at 3450 rpm.



New Double-End Grinder
Includes quick clamping features.

Claimed to be accurately machined, the tool rest table is adjustable to all angles between 30 degrees towards the wheel and 30 degrees from the wheel. The table is also adjustable and has quick clamping features to compensate for wheel wear.



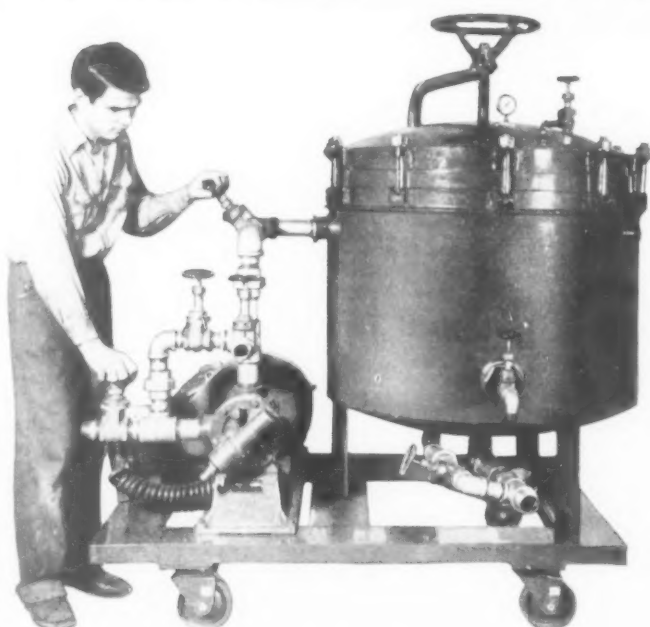
Semi-Automatic Knurling Machine
Claims to replace lathe knurling.

SEMI-AUTOMATIC KNURLING MACHINE

(J26)

A newly perfected knurling machine has been recently announced by Wm. A. (Continued on page 178)

Preserve those tool bits!



Capacities to 10,000 gallons per hour

SPARKLER MANUFACTURING CO.
278 Lake Street MUNDELEIN, ILLINOIS

*SAVE grinding time,
man hours and oil*

SPARKLER

HORIZONTAL PLATE FILTERS

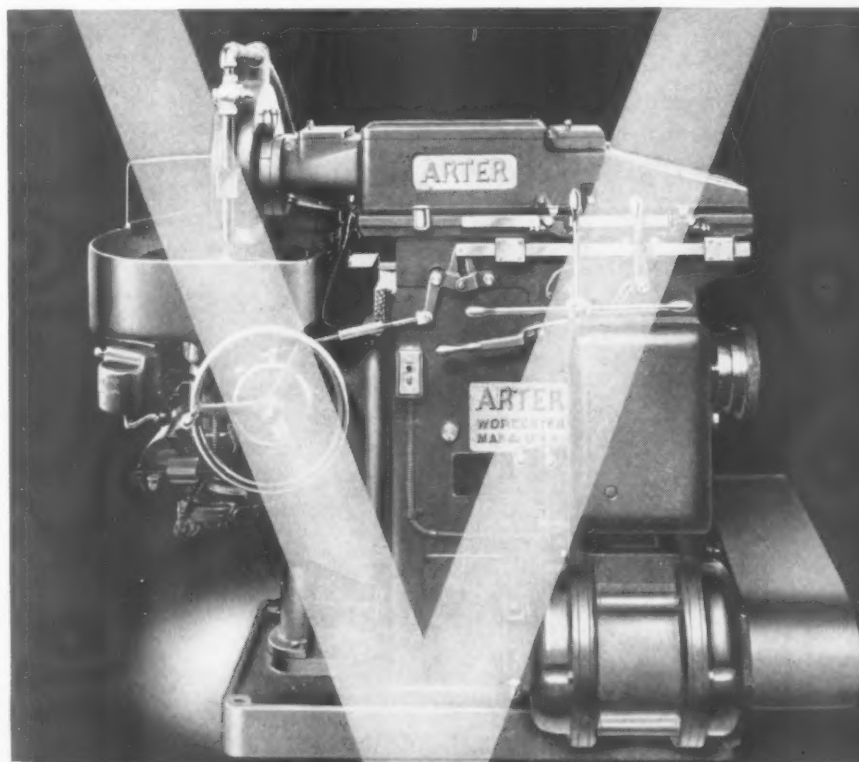
There's no limit to the treatment you can give your cutting oils with these Sparkler Filters of advanced design and performance. Coarse particles may be eliminated from a thin oil, or a heavy oil completely purified and dehydrated, with equal facility and efficiency.

After Sparkler filtration the wheel cuts faster and lasts longer—the quality of the work is vastly improved. It accomplishes removal of the microscopic abrasive enemies so destructive to cutting tools. Filtering with the Sparkler keeps the oil clean, making disinfectants more effective in reducing dermatitis.

Write for full demonstration right in your plant—no obligation. Or send us a sample of your dirty oil for filtering test.

SPARKLER FILTERS

WITH THE HORIZONTAL PLATES



V also stands
for **VERSATILITY.**

Arter Rotary Surface Grinders give you wide versatility—precision surface grinding on a wide variety of surfaces.

Are you using your **Arter Rotary Surface Grinders** to their full capacity?

Arter grinding engineers are always at your service—to help you gain production-plus, the all-important need of the hour.

ARTER GRINDING MACHINE COMPANY

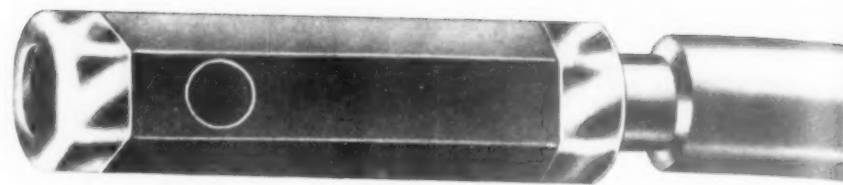
WORCESTER, MASSACHUSETTS • U. S. A.

Force & Company, Inc., Brooklyn, N. Y. The work pieces are fed by hand and the unit is said to have a production rate of 1000 pieces and over per hour. The work is brought to the knurling roll through the action of the foot treadle and is ejected upon retraction.

Claimed to replace lathe knurling, the machine in the accompanying illustration is tooled for knurling 20 mm. shells. Similar units may be assembled for knurling other cylindrical pieces in diameters ranging from $\frac{1}{4}$ to 3 inches.

PLASTIC GAGE HANDLES (J27)

Because of the shortage in critical



Federal Tool's Plastic Gage Handles
Lighter touch is permitted through the use of plastic.

metals, the Federal Tool Corporation, 405 North Leavitt Street, Chicago, has recently developed a plastic gage

handle. These new Federal Taperlock gage handles are said to be accurately made to the standard dimensions accepted throughout the industry. Because the plastic material from which these gages are made is much lighter than metal, it is claimed that a lighter touch is permitted thus reducing the possibility of fatigue from long continued use. Available in any quantities, they are marked with the same lettering stamps used for marking metal handles.

TANNEWITZ HIGH SPEED METAL CUTTING BAND SAWS

... a far Faster Means of Cutting

TEMPLATES

from SHEET STEEL up to $\frac{1}{4}$ "

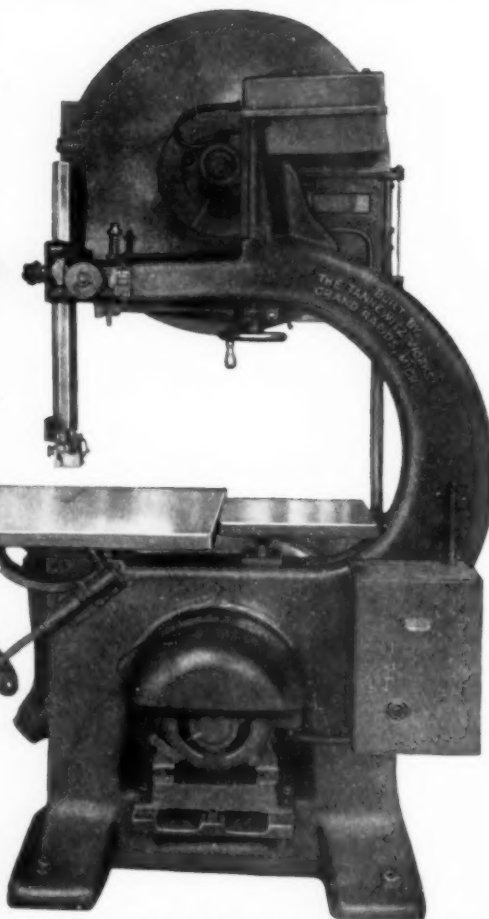
NON-FERROUS MATERIALS

of all kinds up to 3" thick — see chart below

SAVE THEIR COST IN SHORT ORDER

These superb machines, delivering over two miles of saw blade travel per minute without vibration, are doing hundreds of metal cutting jobs in a fraction of the time previously required, in metal working plants of every description throughout the country. To increase production and make important savings get the details NOW! A line requesting Metal Cutting Band Saw Bulletin will bring them to you promptly.

KIND OF MATERIAL	Thickness and weight per square foot												
	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"
MILD STEEL	24	6	3	1									
STAINLESS STEEL	6	2	1										
YELLOW BRASS ZINC	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
BRONZE OR COPPER	6	3	1 1/2	3/4	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ALUMINUM	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
DURALUMINUM	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
SIMPLE PLYMETAL													
DOUBLE PLYMETAL													
PLYWOOD	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
ASBESTOS BOARD	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
FIBRE (HARD)	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
PAPER BOARD	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
MASONITE	24	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
BAKELITE	12	6	3	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2

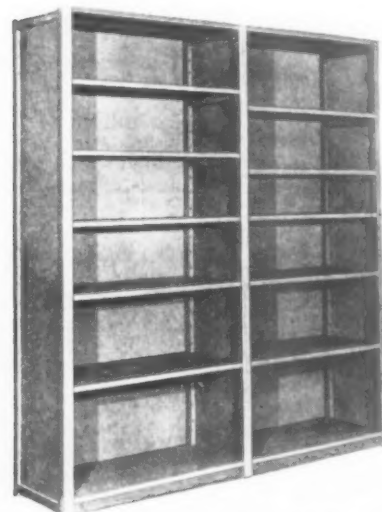


PERFECTLY SAFE: Two-wheel Lockheed Hydraulic Brakes automatically and instantly stop the wheels in case of saw blade breakage—completely guarded.

Incorporated in Tannewitz High Speed Band Saws are many highly developed, patented features found in no other band saws.

Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.



Wood Shelving for Factories
Said to be easy to set up.

ADJUSTABLE WOOD SHELVING (J28)

Storage equipment for factories such as adjustable shelves, bin fronts, dividers, and shelf boxes are now being constructed of wood for the duration of the war it was recently announced by Lyon Metal Products, Inc., 3125 Clark Street, Aurora, Illinois, a manufacturer of these products.

This adjustable wood shelving, made in open and closed types, comes in sections which are 36 inches wide, 84 and 96 inches high, with 12, 18, or 24 inch depths. Side panels and the back panels on the closed type are of $\frac{1}{4}$ inch plywood. They are said to be easy to set up and are finished with a green tinted preservative coating that reduces moisture absorption.

THE END.

**BRAEBURN ALLOY
STEEL CORPORATION**
(Pittsburgh District)
BRAEBURN, PA.

VINCO

**18-4-1
High Speed
Steel**

Chemical Analysis

Carbon
.70-.75

Chromium
4.00

Tungsten
18.00

Vanadium
1.00

Heating Instructions

Forging
Annealing
Hardening
Preheat
High Heat
Draw

(Brinell 228-241)

(Quench in Oil or Air)

1800 To 2050° F.
1600° F.

1500 To 1550° F.
2300 To 2380° F.
1050 To 1150° F.

Hardness Data

Draw	2300° F. Oil	2380° F. Oil
As Quenched	C-65	C-65
1050° F.	C-63	C-64
1100° F.	C-62	C-63
1125° F.	C-60	C-61
1150° F.	C-59	C-61
1200° F.	C-55	C-55

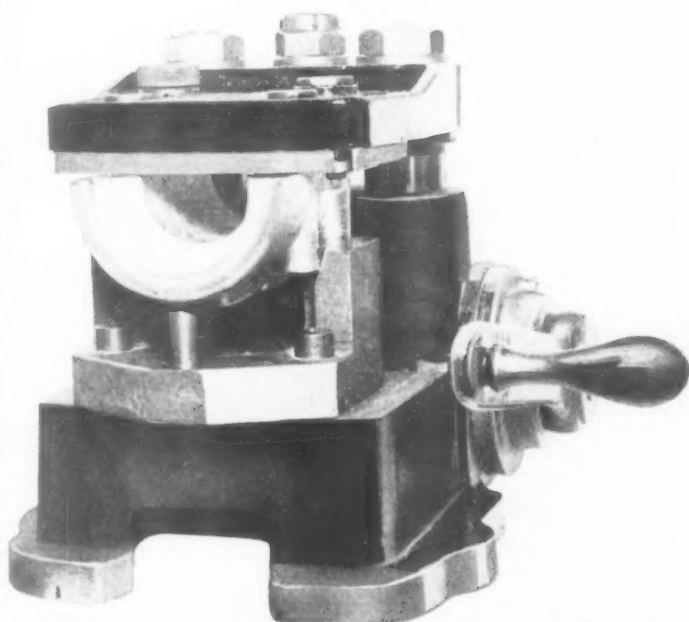
Applications

HOBS	TAPS
DRILLS	REAMERS
PUNCHES	CHASERS
BROACHES	LATHE TOOLS
PLANER TOOLS	BLANKING DIES
MILLING CUTTERS	WOOD WORKING KNIVES

WRITE FOR LITERATURE

BRAEBURN ALLOY STEEL CORP.

BRAEBURN, PA.



SPEED TOOL DELIVERIES WITH STANDARD FIXTURES

**SIMPLE ADAPTERS CAN BE USED TO
HOLD COMPLICATED PARTS WHILE
MACHINING**

THE FIXTURE ITSELF NEVER BECOMES OBSOLETE

An aeroplane main bearing cap is shown,
chucked ready to drill 6 bolt holes. Part is
positioned from four bosses in lower adapter
and squared and clamped on finished face by
fixture head.

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley

ASK FOR CATALOG 238

Detroit, Michigan

Represented by

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Houston—Engineering Sales Co.

Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
St. Louis—Mill Supply & Mach. Co.
Beverly Hills, Cal.—Criterion Tool Sales
Oneida, N. Y.—W. F. Himmelsbach

Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool
& Equipment Co.

NEW LITERATURE

Of Interest to Production Executives

T.M. REG. U.S. PAT. OFF.



(538) Milling Machine

Fray Ram Type No. 9 Milling Machine. 4 pp. Fray Machine Tool Company, Glendale, California. This new folder completely describes the horizontal and vertical milling machine made by this concern. The folder is illustrated, one illustration having arrows which point out the important parts of the machine. Specifications are given

along with a discussion on milling at all angles.

INFORMATION FREE

To receive booklets listed in this section, place key number of desired literature and your name and address on postcard on page 155 and mail to THE TOOL ENGINEER.

(539) Metals

Cerrosafe for Accurate Proof-Castings, Models, and Patterns. 1 pp. Cerro De Pasco Copper Corporation, 40 Wall Street, New York. This bulletin describes a new alloy offered by this company. It includes a table on the thermal shrinkage and growth of the product. The properties of the alloy are mentioned and applications and new uses are given.

(540) Safety

Power Press Protection. 16 pp. Junkin Safety Appliance Company, 930 West Hill Street, Louisville, Kentucky. Said to be this company's contribution to the Conservation of Manpower Program, this booklet deals with the operation, maintenance, and safety of power presses.

(541) Welding

Westinghouse A-C Welders for Use With the Unionmelt Process. 8 pp. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. This new booklet describes a new welder that is designed especially for use with Unionmelt welding. Advantages are given and its performance with this process is told. Several applications are listed and described. Photographs illustrate the various parts of the unit and some of the applications.

(542) Grinding

For Grinder Men Only—Ladies Night. The Koebel Diamond Tool Company, Detroit. This instruction booklet offered by this company is said to supplement the regular training programs of plants in instructing women new to industry on the dressing and truing of grinding wheels. Including cartoons and captions, this booklet explains how a wheel should be dressed, the necessity for care in the handling of diamond tools, the importance of taking light cuts, the use of a "drag" angle, correct speed, and other factors bearing on the economical and efficient utilization of diamond tools and grinding wheels.

(543) Inspecting Metal Parts

Magnaflux Presents a New Technique for the Detection of Structural Flaws. 4 pp. Magnaflux Corporation, 5908 Northwest Highway, Chicago. This folder describes a method of inspecting magnetic metal parts by fluorescent indications under black light. Illustrations are included and applications are discussed. A method for non-magnetic inspection is also mentioned.

(544) Steel

Handbook of Special Steels. 127 pp. (Continued on page 182)

THE TOOL ENGINEER



On vital war parts like these, the 3 to 1 advantage of circular mills over single point tools shows a big saving in cutting time alone. But you save much more than that:

After grinding one or more single point tools, you must adjust each tool to cut its individual diameter, radius or shoulder. This takes time and often wastes product.

Compare with this—to sharpen a set of circular mills you check them to a predetermined micrometer gage reading, replace them in the head, and one simple adjustment brings all four to exact cutting size. No fussing for sizes, no experimental scrap loss.

These Self-Opening Hollow Mill heads also shorten the time cycle—snap open at end of cut, avoid "step" marks and insure uniform finish.

And don't forget this: Circular tools give you 10 times more cutter or chaser life, and you can hollow mill and thread with the same head simply by changing circular mills to circular chasers with chaser blocks—"Double Duty" tools.

Ask for Catalog D-42

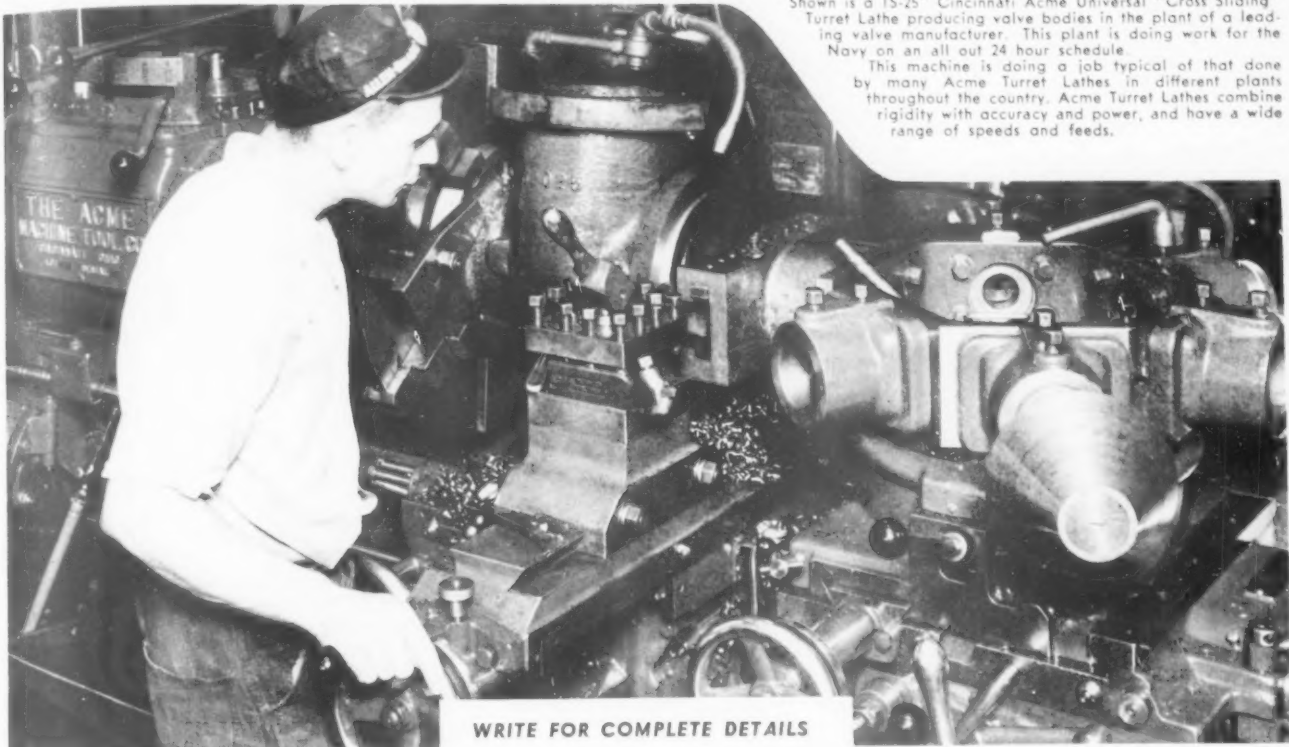
NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME GRIDLEY 4-B AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

CINCINNATI
ACME
UNIVERSAL
TURRET LATHES

ALL OUT PRODUCTION FOR OUR NAVY

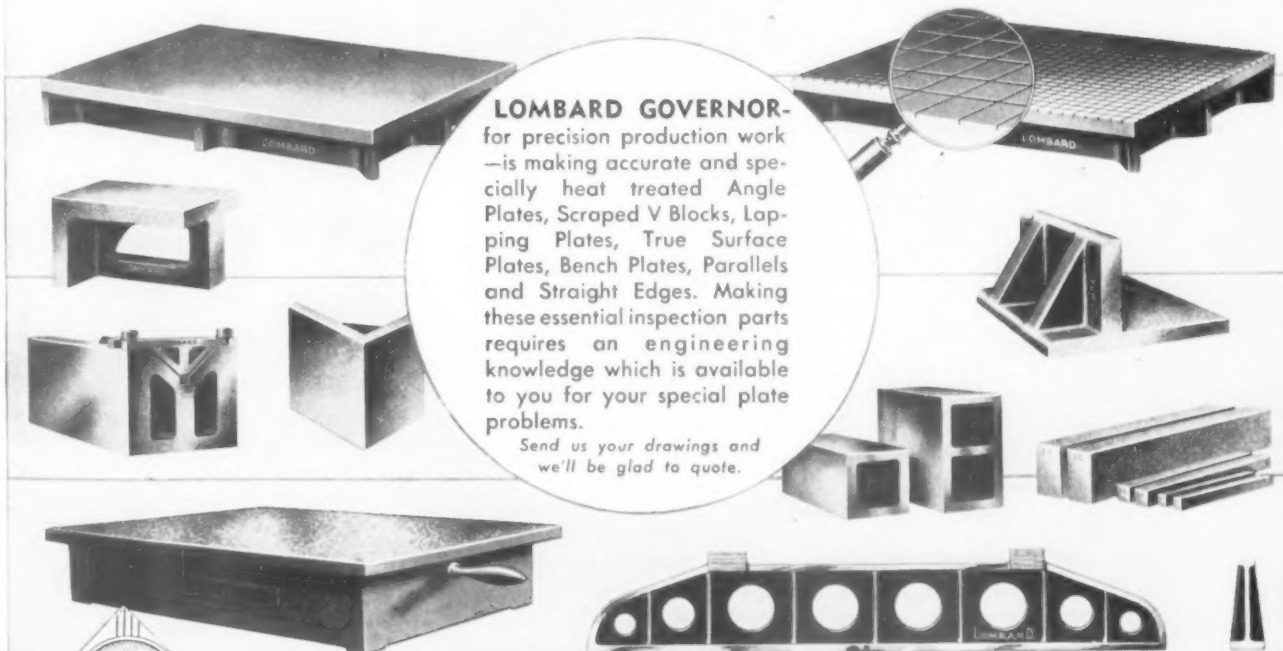


Shown is a 15-25" Cincinnati Acme Universal "Cross Sliding" Turret Lathe producing valve bodies in the plant of a leading valve manufacturer. This plant is doing work for the Navy on an all out 24 hour schedule.
This machine is doing a job typical of that done by many Acme Turret Lathes in different plants throughout the country. Acme Turret Lathes combine rigidity with accuracy and power, and have a wide range of speeds and feeds.

WRITE FOR COMPLETE DETAILS

THE ACME MACHINE TOOL COMPANY, CINCINNATI, OHIO

Have You a Special Plate Problem?



LOMBARD GOVERNOR—for precision production work—is making accurate and specially heat treated Angle Plates, Scraped V Blocks, Lapping Plates, True Surface Plates, Bench Plates, Parallels and Straight Edges. Making these essential inspection parts requires an engineering knowledge which is available to you for your special plate problems.

Send us your drawings and we'll be glad to quote.



LOMBARD GOVERNOR CORPORATION

100 MAIN ST., ASHLAND, MASS., U. S. A.

Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. This is a revised handbook on the properties and uses of special steels which incorporates information on the various grades of stainless, tool, and other special alloy steels. Said to be particularly adapted for use by design engineers and production men, this handbook includes data for guidance in the proper selection, treatment, and use of these alloy steels. An appended table sets forth the recommended types for particular applications, and information on Drill Rod with a list

showing prices, sizes, and weights.

(545) Power Presses

Johnson Inclined Power Presses. 18 pp. Johnson Machine and Press Corporation, 622 West Indiana Avenue, Elkhart, Indiana. This catalog describes, illustrates, and gives the specifications of the various types of presses made by this concern. Line drawings of the various parts of the machine plus a parts chart are included.

(546) Silver Solder Flux

Use "Xcel-Flux" Fluxes for Welding and Brazing All Metals. American

Products Corporation, Dept. T., 422 South Dearborn Street, Chicago, Ill. This folder lists the various types of fluxes, their applications and prices. Coming in three forms, powder, paste, and fluid, each type is carefully described.

INFORMATION FREE

To receive booklets listed in this section, place key number of desired literature on postcard on page 155 and mail to **The TOOL ENGINEER.**

(547) Electrode Holder

How to Adjust and Operate the Atomic-Hydrogen Electrode Holder. 16 pp. General Electric Company, Schenectady, New York. This recently issued bulletin describes in detail the progressive steps in the adjustment and operation of this electrode holder. Among the subjects discussed at length are right and wrong methods of adjusting the electrode and hydrogen supply, striking the arc, controlling the arc length and current setting, and starting the weld.

(548) Planers

Ohio Planers. 12 pp. The Ohio Machine Tool Company, Kenton, Ohio. A feature of this new bulletin is the use of large illustrations of the various types of planers that this concern builds. Each machine is described and the specifications are given. Various accessories for the planers are described, including the power rapid traverse. Other machine tools built by this concern are also mentioned in the bulletin.

(549) Wall Chart

Spark Testing Tool Steels. The Carpenter Steel Company, 122 Bern Street, Reading, Pa. This wall chart has a two-fold purpose—to help tool steel users to segregate their scrap and to help classify tool steels that have lost their identities in stock. It provides spark diagrams for Carpenter matched tool steels plus descriptive information on the spark characteristics of major elements such as tungsten and molybdenum.

(550) Lubrication

Motor Mica. Scientific Lubricants Company, Dept. M., 3462 North Clark Street, Chicago. This new bulletin shows where the lubricant manufactured by this concern can be used in such operations as stamping, drawing, turning, drilling, milling, threading, tapping, boring, die casting, and screw machines. Also contained in the bulletin are detailed mixing instructions for this lubricant.

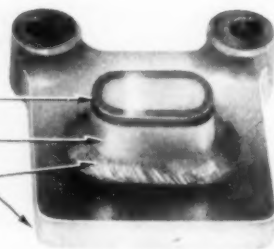
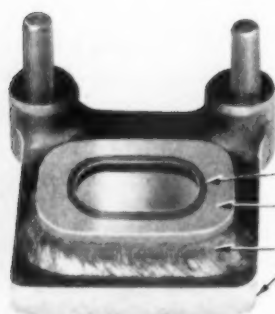
(551) Hardening and Deep-Drawing Steel

Unichrome Alkaline Copper Processes to Improve Selective Hardening and Deep-Drawing of Steel. 6 pp. United

(Continued on page 184)

UPP and ADAM Broadcast No. 1002 •• by Mason-Hahn

HEY ADAM, DID YOU EVER USE THOSE EUREKA TOOL STEEL ELECTRODES?



I'LL SAY I HAVE—THEY'RE LIKE CHINA EGGS OR THE MARINES YOU CAN'T BEAT 'EM!

The Eureka Electrodes Upp and Adam refer to are for use in *your* shop on oil, air and water hardening, and hot work steels. We also furnish alloy rods for drawing and forging dies, etc. For further information about Eureka Electrodes please wire or write for our catalog describing in detail the work that can be performed with this type of electrode.

Don't forget our "Suttonizing" Process by which we reclaim by welding all high speed steel tools such as Reamers, Broaches, Taps, Form Cutters, Drills, Hobs, Lathe Centers, Turning Tools, End Mills, etc.

**WELDING EQUIPMENT
& SUPPLY CO.**

222 Laib Street

DETROIT, MICHIGAN

✓ PYOTT

A NAME TO CHECK FOR POWER TRANSMISSION



MULTIPLE V-BELT DRIVES

The complete drive or component parts correctly designed. Sheaves up to 9 feet in diameter.

PULLEYS AND FLYWHEELS

All types made from our stock patterns. Diameters up to 12 feet—any face width.

GEARS AND SPROCKETS

Cut or cast from semi-steel or cast iron. Stock patterns used for cast types.

FOUNDRY WORK—OF COURSE

Tough jobs in cast iron or semi-steel are easy—46 years experience really counts.

PYOTT FOUNDRY AND MACHINE COMPANY
328 NORTH WINGAMON STREET CHICAGO

Torque Wrench

MORE ACCURACY
LIFE
SPEED

3 DIALS



NO FRICTION
ADJUSTMENTS
MOVING PARTS
FRAGILE MECHANISMS

Constructed for exacting laboratory work or continuous production use.

A practical wrench correctly engineered.

PERMANENT ACCURACY.

A capacity and size to fit your needs.

State capacity needed.

PIONEER MANUFACTURERS OF
ACCURATE MEASURING WRENCHES

P.A. STURTEVANT CO.
ADDISON/QUALITY/ILLINOIS

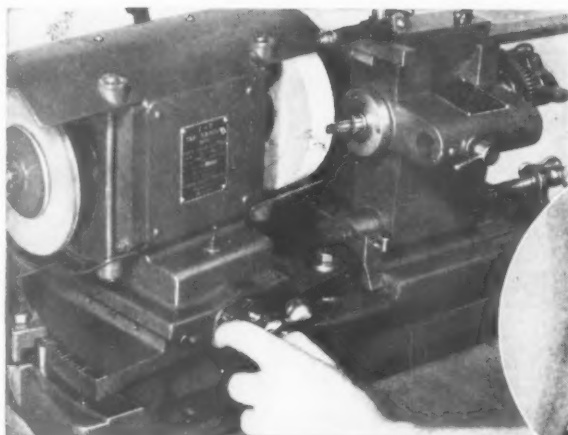


Photo at right shows tap held in Blake bushing.

GET UP TO 10 TIMES MORE HOLES PER TAP

By sharpening them on the

J-B TAP GRINDER

The Blake Tap Grinder has shown that the practice of throwing away dull taps is extremely wasteful. In these days of war production, a continuation of this practice is almost criminal.

Why scrap dull taps when the Blake assures you of at least double the number of tapped holes, and in most cases will increase them ten times? The Blake will grind the chamfer on right- or left-hand taps with 2, 3, 4, 5, 6, 8 and 10 flutes. Capacity—No. 0 to 2". Additional profits and production may be had by sharpening countersinks and other small tools on the Blake Tap Grinder. (Formerly called the J-B Tap Grinder).

Please send folder giving complete details on the Blake Tap Grinder

NAME.....
TITLE.....
COMPANY.....
STREET.....
CITY.....
STATE.....

T.E.

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

J-B TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS

Chrome, Inc., 51 East 42nd Street, New York. This folder describes this company's process and explains why its characteristics are said to be valuable in the deep drawing of steel parts, where a ductile, adherent coating of copper is required to act as a lubricant between the work and the drawing dies. How this process is an aid in the selective carburizing of gears, shafts, and other steel parts, is also mentioned in the folder.

(552) Bushings

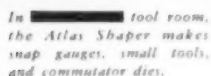
Gateco Precision Rotary Jig and Pilot Bushings, 2 pp. Giern & Anholtt Tool

Company, Detroit. This piece of literature is in data sheet form, ready to file in your data notebook. Besides giving a description of these bushings, this data sheet includes line drawings of turret lathe and drill press applications.

INFORMATION FREE

To receive booklets listed in this section, place key number of desired literature and your name and address on postcard on page 155 and mail to THE TOOL ENGINEER.



In  tool room, the Atlas Shaper makes snap gauges, small tools, and commutator dies.

"Match the Machine to the Job" for Top Production

That fundamental idea — "Match the Machine to the Job" is an important reason why American war producers are forging to the front in the battle of production. The massive jigs and huge assemblies are monuments to American ingenuity and production power.

Just as important are the fast precision tools that take over the production of small parts so that the capacities of larger machines will not be wasted. The Atlas 7" Shaper is one of these valuable smaller tools. It handles everything within a 7" stroke. It is a counterpart of the larger shapers in precision, production and power, and is more flexible in set-ups. 5 automatic cross feeds in either direction and four speeds between 45 and 200 strokes per minute give a wide operating range. It has a complete V-belt drive, crank-type bull-gear drive, and operates from a 1½ HP 1740 RPM motor. You will find Atlas Shapers in many of the plants that are winning "E" awards. Send for complete information. Atlas Press Company, 1114 N. Pitcher St., Kalamazoo, Michigan.

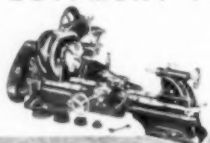


OTHER ATLAS EQUIPMENT FOR WAR PRODUCTION



MILLING MACHINES

Compact, powerful bench millers for full range of milling work.



LATHES

Back-gear, screw-cutting lathes with V-belt drive, power cross feed.

DRILLING MACHINES

Step-up production on small-hole drilling, tapping, 4, 3, 2-spindle models.



Also included is a chart of sizes and specifications.

(553) Welding

Trindl Super Industrial Arc Welders, 2 pp. Trindl Products Ltd., 2227 TE Calumet Avenue, Chicago. This booklet describes and illustrates various models of arc welders manufactured by this concern. Features are listed and specifications are given.

(554) Electric Tool Maintenance

Keep 'em Working, 12 pp. The Rotor Tool Company, Cleveland, Ohio. The general purpose of this booklet is to tell how to take care of high-cycle tools. This is just one part of a tool conservation plan by this concern, which includes posters and booklets on conservation of both pneumatic and high cycle electric tools. The booklet stresses periodic checks of the tools. It is illustrated.

(555) Salt Baths

Park Salt Baths, 6 pp. Park Chemical Company, Detroit. This folder describes salt baths for the heat treatment of carbon and alloy steels, high speed steels, and non-ferrous metals. Photographs show typical salt bath installations in various plants. Specifications are given for the different kinds of salt baths.

(556) Grinding

Themac High Speed, Portable, Electric Precision Grinders, 20 pp. The McGonegal Manufacturing Company, East Rutherford, N. J. Construction details along working drawings of the machine are given in this new folder. Each type is illustrated, the equipment listed, and the specifications given. A price list is also included with the folder.

(557) Electric Furnaces

Electric Furnaces for Industrial and Laboratory Uses, 4 pp. Cooley Electric Manufacturing Corp., Indianapolis, Indiana. Various uses to which these furnaces may be put to are listed in this folder. The heating elements are described and the features are discussed. Installation and operation are mentioned and the furnaces illustrated. Prices, ordering instructions, and specifications are given.

(558) Lifting Machines

Lifters by Service, 4 pp. The Service Caster & Truck Company of New England, 440 Sommerville Avenue, Sommerville, Mass. Many different kinds of lifting devices at actual work are shown in this folder, each briefly described. Among those shown are die and mold lifters, skid and pallet lifters, and barrel and drum lifters.

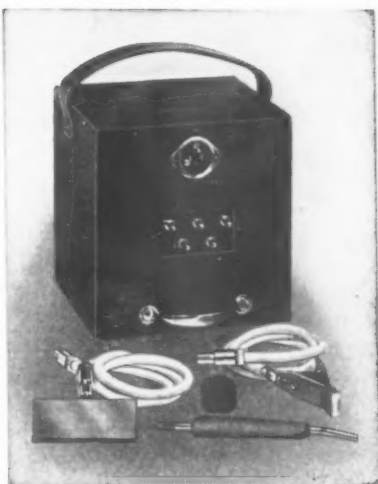
(559) Drill Rods

Crucible's Drill Rods, 6 pp. Crucible Steel Company of America, 405 Lexington Avenue, New York. This folder

(Continued on page 186)

Mark Iron,
Steel and
Carbides the
Etchograph
Way

2000 IN USE



NEW JUNIOR MODEL

Buy the Original Electric Etcher

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

With New ELKONITE TIP Pencil

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly.

Write for circulars and prices.

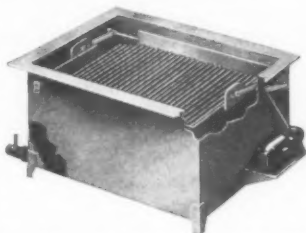
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Metal Parts CLEANING**

**STURDY-BILT
"SIMPLEX"**

Metal Parts CLEANER

This small, compact, automatic and mechanically simple unit combines the two most positive methods of cleaning Metal Parts, Assemblies, Shells, Cartridges, Castings, Stampings, etc. A swishing action positively removes all grease, oil, dirt and metal chips that have been loosened during the "chemical action" of the "soak". Can be installed in different departments or in a series — one unit for cleaning, another for rinsing or rust prevention coating and others for special requirements. Send for "Simplex" bulletin for complete details.



and for
**CONTINUOUS
Large Scale
PRODUCTION**

... the STURDY-BILT "Soaker-Hydro" CLEANER

Combines long agitated "soak" with hydro washing action for large production. Parts are loaded onto trays, passed through the soaking tank — then are rinsed to remove oil film and clinging chips — then subjected to a power wash. They are removed dry and ready for use or for the next manufacturing operation. Simplicity is the keynote of construction as well as operation. Send for complete details.

STURDY-BILT EQUIPMENT CORP.
Department T-11 WEST ALLIS, WISCONSIN



DIAMOND WHEELS for CARTRIDGE DIES

JKS resinoid-bonded Diamond Wheels for internal grinding of tungsten steel cartridge dies, produce straight holes of mirror-like finish, accurately, speedily and economically. Roughing and finishing wheel diameter 7/16 in.; length 3/8 in.; bore 1/8 in. Special sizes to order. Consult a JKS representative or write for folder.

Prompt deliveries

J. K. SMIT & SONS, INC.
157 Chambers Street, New York



SECOMET Resinoid Bonded Diamond Wheels can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-bladed tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding operation. Catalog on request.

Prompt deliveries

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gives the complete specifications of the drill rods as to size, decimal equivalent, weight pounds per foot, and the approximate weight per 3 foot bar. General information, including prices, is given.

(560) Transmissions

Up to 30 h. p. Western Transmissions. 2 pp. Western Manufacturing Company, 3400 Scotten Avenue, Detroit. This is an insert for the catalog recently released by this company and illustrates the installations of this concern's transmissions on a number of cone driven machine tools, such as automatics, bor-

ing mills, slotters, vertical turret lathes, and thread millers.

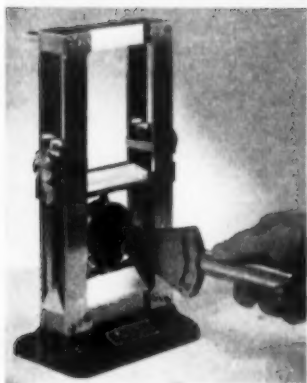
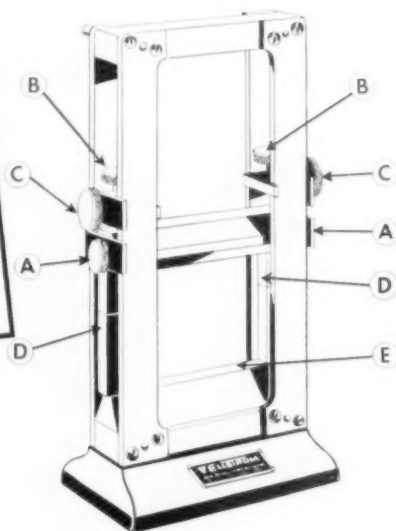
(561) Finishing of Steel Parts

Du-Lite Steel Coloring Process. 8 pp. Du-Lite Chemical Corporation, Middletown, Conn. This booklet covers the

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Increase your efficiency in setting your Internal Indicators



Above is a photograph of the Ellstrom Gage with the indicator being set at 3". To insure the ultimate in accuracy, each Ellstrom Gage is constructed of the finest steel with gaging surfaces that are processed and finished to millionths in flatness. For prices and delivery information wire or write today.

THE diagram drawing above shows the Ellstrom Gage set at 3" and the key explanation below gives the adjusting procedure.

Screws A on upper parallel bar have been carefully adjusted and need not be touched. In raising or lowering the bar loosen only screws C, then place fingers on screws A, and move bar upward or downward as the case may be, but without turning the screws.

Allow room to place the gage blocks on lower parallel between the posts of the gage. Then lower bar until its surfaces and those of the blocks fit snugly without any forcing. Tighten screw C lightly and evenly. Screws B are then used to apply slight pressure in making final adjustment.

D gage blocks E stationary parallel

Originators of Chromium Plated Gage Blocks

DEARBORN GAGE COMPANY 22037 BEECH STREET
DEARBORN, MICHIGAN

advantages, development, and description of this process of black oxide finishing for steel parts. It is claimed that it is being used for finishing tools of hard or soft steel because it is rust resistant, friction reducing, and has oil absorption qualities. The booklet is illustrated.

(562) Boring Mill

The Multi-Purpose Machine Tool — Yoder 3 A Horizontal Boring Mill. 8 pp. The Yoder Sales Company, 5500 Walworth Avenue, Cleveland, Ohio. Designed with a convenient name flap for filing, this new folder describes the complete control of the machine through a power touch control and a power flow drive. Specifications are given and the various parts of the machine, numbered by means of a line drawing, are described. Completely illustrated, the booklet also shows and describes the various attachments available for the machine.

(563) Engraving and Etching

The Gorton Munitions Engraver and New Spit-Fire Electric Arc Etcher. 8 pp. George Gorton Machine Company, Racine, Wisconsin. This booklet shows a variety of work being done by their engraving machine and arc etcher. Both machines are illustrated with various attachments and the specifications are given. It describes how the machines operate and a close-up of the arc etcher in action is included. Space is devoted to other equipment manufactured by this concern and the prices are given for all the equipment listed.

(564) Metal Cleaning

Detrex Metal Parts Washers. 24 pp. Detroit Rex Products Company, 13005 Hillview Avenue, Detroit. An abundance of photographs and blueprint drawings of the various types of cleaning machines manufactured by this concern is one feature of this new catalog. Washers using petroleum spirits and emulsion cleaners and others using alkali cleaning compounds are illustrated and described. One page is devoted to the safety factors of the machine while still another section deals with the processing equipment manufactured by this concern. Cleaning compounds, shot testing machines, solvent degreasing, and degreasing solvents are also described.

(565) Lathes

Colborne Speed Lathes. Colborne Manufacturing Company, 157 West Division Street, Chicago. This folder illustrates and describes the lathe manufactured by this concern. Complete specifications are included.

(566) Motion Pictures on Grinding

Motion Picture Lessons in Grinding. 6 pp. Norton Company, Worcester, Mass. This folder describes a new series of motion pictures produced by this
(Continued on page 188)

**Maximum Tool Life
plus Maximum Production
— Use CROBALT!**

● A superior heat resisting chromium-cobalt-tungsten high speed cutting alloy. Permits higher speeds with longer tool life.

Eliminates the possibility of chipping. Combines maximum production with minimum cost per piece.

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CROBALT INC.
ANN ARBOR, MICHIGAN

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with Sterling Portable
Speedbloc Sander



STERLING TOOL PRODUCTS CO.
373 East Ohio Street • Chicago, Ill.

Proven Performance

**Tool Engineering
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- We are working with some of the largest war manufacturers in the U.S.A. — to their complete satisfaction.
- We are ready to handle **ALL** branches of armament production.

Almost 200 Trained Men

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Engineers of Complete Tooling Programs
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Work Benches
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LYON METAL PRODUCTS, INCORPORATED AURORA, ILLINOIS
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concern entitled "Lessons in Grinding." For use in schools where machine shop practice is being taught, these films are intended to present merely the fundamentals of grinding to the inexperienced man. The folder shows typical shots from each film.

(567) Plating Solution Filter

Sparkler, Horizontal Plate, Plating Solution Filter. Sparkler Manufacturing Company, Mundelein, Ill. This leaflet not only illustrates and describes the filter made by this concern, but also discusses the construction, capacity, and

flexibility of the machine.

(568) Reclamation of Tools

The Reclamation of High Speed Steel Tools by Suttonizing . . . A Welding Process. 27 pp. Welding Equipment and Supply Company, 223 Leih Street, Detroit. This new catalog features 88

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pictures of cutters, reamers, broaches, and other steel tools reclaimed by this method.

NEW BOOKS

Breaking the Skilled Labor Bottleneck by Eugene J. Bengt, Management Engineer, \$2.50. Publishers: National Foreman's Institute, Inc., Deep River, Conn. This is a manual of procedures and is based on the author's experience in all phases of shop practice and in contact with both workers and plant executives. His study brings to the reader many ways in which labor shortage may be overcome or avoided. The method which showed the most immediate results was that of subdivision of skills combined with intensive training.

This book explains how to maintain peak production; how to train new help as quickly as possible; how to get the most out of present labor resources; how to divide work so as to spare highly trained men for own type of work; what to do about upgrading; how to get the best results from supervision, and many other suggestions and tested ideas.

Advanced Blueprint Reading. 300 pp. This book has been added to the list of educational literature available for war production training of workers. The book, with a few other monographs, will complete the national defense training project of educational literature prepared under the supervision of the New York State Education Department and distributed with the cooperation of the American Society of Tool Engineers.

Arc Welding Job Training Unit and Gas Welding Job Training Unit by the staff of the Dunwoody Industrial Institute, \$1.25 each. American Technical Society, Chicago. These two new manuals are said to have been tested on the job, both in industry and in schools. The arc welding unit consists of 40 jobs with an information sheet and a sheet of check-up questions for the first 32 jobs. There are 103 pages in this unit, illustrations and a page of fundamental welding symbols included.

The gas welding unit also has 40 working examples. This unit has a total of 92 pages and is illustrated.

Nomenclature of Naval Vessels. \$1.25. Chemical Publishing Company, 234 King Street, Brooklyn, N. Y. This book is said to have been primarily for use in the apprentice schools at the various navy yards and stations. It is claimed that it is useful for reference purposes by engineers, draftsmen, and others interested in the construction of naval vessels.

Grind Quicker... Grind Smoother
ON EVERY WAR-TIME JOB
WITH THESE
SKILSAW TOOLS!

• Here are FIVE kinds of SKILSAW TOOLS you shouldn't be without, if you want to speed up your finishing operations, reduce waste and increase your output in war production. Do you have welds to grind down? Stainless steel or brass sheets to polish? Castings to clean? Small machine parts to finish? There's a SKILSAW TOOL for each of these operations . . . and the job will get done quicker and better and at lower cost.

These SKILSAW GRINDERS and SANDERS are typical of the entire line of SKILSAW TOOLS—designed to deliver results under today's stepped-up conditions, built to stand hard usage without time-wasting breakdowns. Look into America's busiest war-work plants and you'll see SKILSAW TOOLS on the job. Ask your distributor for a demonstration and you'll see why!

NEW!
SKILSAW PORTABLE GRINDERS
Just introduced to speed up production on every war-time job—grinding down rough welds, smoothing welding beads, cleaning metals, filing, buffing and polishing on every metal surface. Two Models.

SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Sold by leading distributors of mill and welding supplies.
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DISC SANDERS
Sanding stainless steel to a perfect finish is faster with SKILSAW Disc Sanders. Also remove waste metal, buff and polish on all surfaces.

BELT SANDERS
SKILSAW Belt Sanders speed up all "final finishing" on flat surfaces of bronze, brass and all sheet metals. Remove paint.

HAND GRINDERS
SKILSAW Hand Grinders are swiftest, better on all grinding of jigs, dies and for precise finishing on machines and castings.

BENCH GRINDERS
Spotted conveniently throughout the plant, SKILSAW Bench Grinders speed production, keep tools and twist drills sharp, grind small parts.

There is no substitute for

Rawhide

... and the hide of the Java Water Buffalo such as is used in Chicago Rawhide Hammers and Mallets is the toughest and the most enduring of all. These fine tools in sizes from 2 ounces to 6 pounds are not only long-lasting but are made to strike thousands of blows accurately and safely without damaging surfaces or materials from delicate wire insulation to heavy duty yet precision made crankshafts.

These tools, in the size you need are at your dealers.

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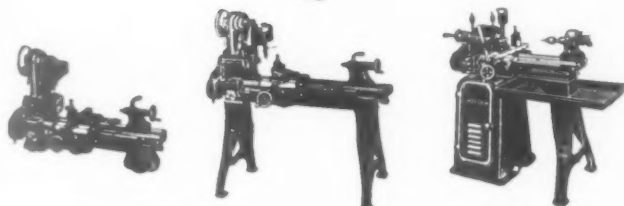


SHELDON Back Geared Screw Cutting PRECISION LATHES



For the Tool Room

The finest 10", 11" and 12" lathes ever built in the moderate price field. Large special analysis steel spindles. **GROUND ALL OVER**, with extra collet capacity. Hand-scraped Bronze. Ultra-Precision Ball or Super Precision Roller spindle bearings. (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction, 4-speed, V-belt lever-operated pedestal base motor drive illustrated. Telescopic Taper Attachment and other accessories available.



For Production

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings. Lever-operated Collet Attachment. Lever-operated Tail Stock. Lever-operated cross slide with double tool post. Lever-operated turret, etc.

For Machine Shop

Both Bench and floor, models with choice of Semi-quick or Full-quick Change Gears. Plain Aprons or Worm Feed Apron with Power Cross Feed. Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling Attachments and all standard accessories.

Write for Catalog and name of nearest distributor.

SHELDON MACHINE CO., INC.

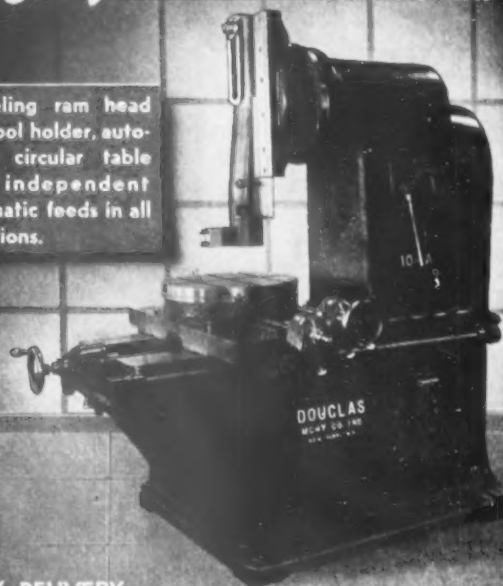
4252 N. KNOX AVE.

CHICAGO, U.S.A.

NOVEMBER, 1942

Douglas 10" STROKE SLOTTER for Precision

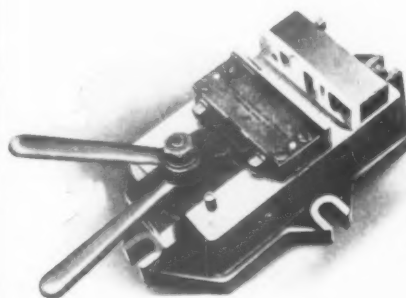
Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.



EARLY DELIVERY
by Large Scale Production

DOUGLAS MACHINERY CO. INC.
150 BROADWAY NEW YORK, N. Y.

HARTFORD'S "Four Point" Milling Vise



1. Power
2. Speed
3. Strength
4. Accuracy

This Hartford "Four Point" Milling Vise features a dual-operation principle of handles which speeds gripping and releasing. The operator can easily apply tremendous power with one hand, manipulating both the binding and the cam-faceted handles at the same time. Maximum strength is possible through a semi-steel base and movable jaw of single heat-treated steel drop-forging. The movable jaw, with its ground fitting surfaces, can accurately hold single piece at either end of jaw. Jaws are in absolute alignment.

WRITE FOR LITERATURE

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

HANDY ANDY says:

T.M. REG. U.S. PAT. OFF.

ANOTHER A. S. T. E. convention, and the welkin rings with the pent-up enthusiasm of Tool Engineers letting go after serious technical sessions. There goes the *Old Mill Stream*, with Connie Hersam off key. (*Shut up, Connie! — let me think*). To make it worse, I forgot my eraser, and a Tool Engineer feels silly without rubber. The most important end of the

pencil, really. By now, a score of interruptions, and the "wee-wee" hours approach.

But there, *Sweet Adeline!* — like throwing the other shoe. Peace and quiet at last, so here goes for a nocturne on the old portable. Here, I'm going to tell you about my triumphal tour of the East, there being other arrangements for telling about the Con-

vention.

As I told you a while back, I was to stop off enroute to Springfield to say a few words to the Syracuse boys. When the news got around, Warren Ames (of the B. C. Ames Company, Waltham, if you please) extended an invitation to bask in Boston's cultural sun. That, of course, entailed considerable shuttling to and fro, besides which I had to get on the good side of the Old Man for an extra three days off, which he kindly granted. (*Thanks, Almy! — I've had a swell time and the bread cast on the waters will come back in lots of fishes*).

THE WORSHIPPERS OF MINERVA put me up at the Parker House, where I relaxed in an atmosphere of friendliness and regaled myself with oysters and clams.

Which reminds me! The boys told me that when King Cole of Chi came to Boston he ordered a bucket of steamed clams, topping off with a second mess for dessert. There's the epicure for you! But that's an aside — we'll go on with the story.

Thurs. evening, the 8th., I attended Boston Chapter meeting at Schrafft's Restaurant, got a royal welcome. There's one thing about Boston Chapter which is typically A. S. T. E. It is *friendly*, with a fine camaraderie, and there is enthusiasm and a lively interest. (See A. S. T. E. DOINGS for events of the evening). Their "Gadget Talks" can well be emulated by other Chapters; they are instructive and tend to develop local talent. Besides, they make good material for THE CRIB.

One of the Boston men showed me a group of pictures — "Hands" — which I'd like to see in THE TOOL ENGINEER. In travelling around, I've mislaid my list of names, but if the good looking acting or ex-Danish consul sees this please write me. This is a reminder.

The fact is, I met so many people all at once I just can't remember 'em all, not being a politician.

ERNIE VANS AW I knew right away, having seen his pic in the TOOL ENGINEER, and Warren Ames. Met various of the guiding spirits of Boston Chapter; presiding C'man John Geddes and past dittos Al Forbes and Cecil Lockwood, along with Bill Rodrick and Jack Savits.

Also, reminisced a bit with Tom
(Continued on page 192)

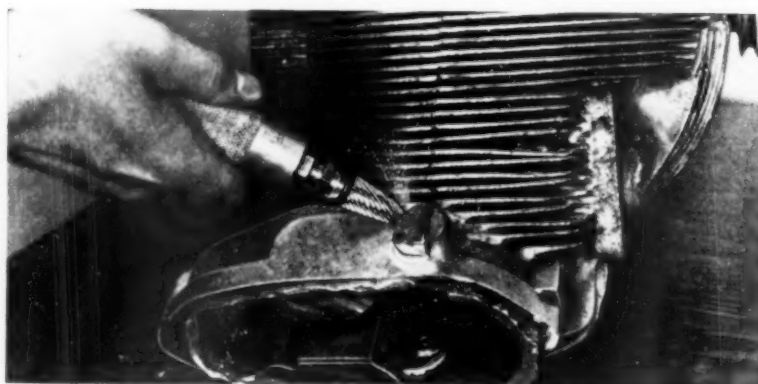
20 TOOLS FOR 7 THE COST OF 7



ACTUAL SIZE UNTOUCHED
PHOTOGRAPHS

COST OF 20 REGRINDS	-	-	-	\$21.80
COST OF 7 NEW TOOLS	-	-	-	20.44

WITH APPROXIMATELY .004 REMOVED WITH
EACH REGRINDING, ENOUGH STOCK
STILL REMAINS FOR 11 MORE REGRINDS



SAME TOOL AS IT IS USED ON AIRPLANE CASTINGS

SEVERANCE TOOL COMPANY

SAGINAW, MICHIGAN

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BRANCH PLANTS

LONG ISLAND CITY, N. Y.
DETROIT, MICH.

LOS ANGELES, CALIF.
CHICAGO, ILL.



UNIVERSAL FIRST COMPANY IN AMERICA TO WIN COV- ETED 20% BOND FLAG

When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

But we're even more proud of the big volume of precision built drill bushings we're turning out daily to help America's arms production.

Universal drill bushings (such as the one shown here) are straight and round with superfinished bores which assure accuracy and unexcelled wearing qualities. Write for facts.



UNIVERSAL ENGINEERING CO.
FRANKENMUTH • MICHIGAN



BOYAR-SCHULTZ SMB MACHINE BOLTS

It is cheaper to use good bolts than to repair the beds of costly machine tools.

SMB Bolts were developed for use in the tool room as well as

in the modern busy machine shop. They are tough and strong, and will stand up under heavy working conditions. Made of special heat treated steel, they are machined with heads square with bodies. Thus, heads present a flat surface to T-slot, safeguarding accuracy of machine and holding work in exact position for heavy cuts. SMB Nuts and Washers are *made* for use with SMB Bolts. They are heat treated and carefully made with threads cut square with face of the nut.

BOYAR-SCHULTZ CORPORATION

2116-M Walnut Street

CHICAGO, ILL.

Cuts Cams with One Set-up

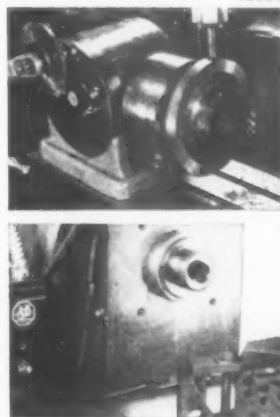
CASE HISTORY NO. 7
The shaping of feed cams is a problem that is easily solved with a SLOMASTER. The cam blank is chucked in a Dividing Head on a milling machine. The rise on the cam is then readily calculated between the Dividing Head Index and the Micrometer Dial on the milling machine Feed Screw. In this way a perfectly true and uniform cam rise is obtained. Only one set-up is required and the time for calculation is negligible. Any other method, such as might be accomplished on a standard milling machine or shaper would require numerous time consuming set-ups.

Thumbnail Illustrates Set-up.

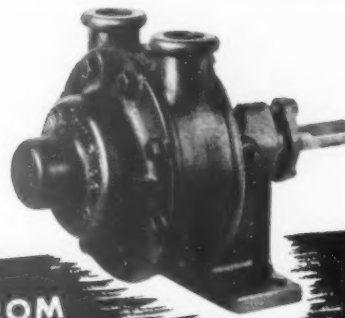
SLOMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . . The stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 s.p.m. . . . The tool holder of the clapper box type, can be turned in any position . . . All of the working parts are of tool steel heat treated and ground to close tolerances . . . SLOMASTER comes complete with pulleys, motor, belt, and mounting adaptable to round over-arm or flat-on round overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE COMPANY
12601 Greiner
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Conventional set-up on round over-arm milling machine.



**DELIVERS FROM
THE SAME PORT**
Regardless of Direction of Shaft Rotation

ONLY TUTHILL AUTOMATIC REVERSING PUMPS GIVE YOU THIS PERFORMANCE

Without the use of check valves, Tuthill Automatic Reversing Pumps deliver from the same port regardless of direction of shaft rotation. This exclusive feature in these positive displacement, internal-gear rotary pumps solves the problem of driving a pump from a reversing shaft without changing the flow of the pumpage. It also provides the answer where the ultimate direction of shaft rotation is not known. Sizes from 1 to 50 g.p.m. and pressure to 100 p.s.i. Available with or without relieving feature. Also in stripped model form.

Write for Tuthill Automatic Reversing Pump bulletin

Tuthill PUMP COMPANY

939 EAST 95TH STREET • Chicago

Bradford, with whom I had trod common paths in past years. Bill Young sent regards to Steve Urban of Syracuse, which I relayed — but that's getting ahead of my story. Got the kick of my life when, in the introduction, Warren Ames read my letter recounting the high spots of my life history. Another time, I'll be more careful.

What I said doesn't belong here, besides which I spoke extemporaneously, on a sudden — and, I believe,

fortunate — hunch that the boys would like diversion from tools for a change. I must have guessed right; anyway, my audience paid me the high compliment of close attention. A speaker can ask for no higher tribute.

COMING IN ON THE TRAIN, revelled in the unfolding panorama of the Berkshires, beautiful in their autumn raiment. Worcester — my wife's home town. Crompton & Knowles, and naturally I thought of John Lindegren.

Showed up at Boston meeting, he did, partly in his capacity as Regional Director and partly as Regional Editorial Vice Ch'man. Swell guy, John!

About the first thing I did, in Boston, was to buy a box of Schrafft's chocolates, that having been the first thing I presented my wife when I started courting her — oh, a few years back. Incidentally, we honeymooned in Boston, apparently a good start for an enduring partnership.

Had planned to go to Providence, my own erstwhile home town, and the matter was settled when Jack Sylvester, who Pratt & Whitneys in that area, offered to drive me down. Oh, they used me royally, those Boston boys! To Boston Chapter as a whole, and especially to Warren Ames for the happy inspiration that brought me there, sincere thanks and wishes for an enduring friendship. You have a niche in my heart from now on.

I WAS ALL AGOG for familiar scenes as Jack Sylvester thirty-five Providenceward, but twenty years had wrought their changes. That is, except for the changeless. Providence remains a city of narrow streets and magnificent (walking) distances, as I found out when too many corners teased with their hope of the unexpected. My dogs finally rebelled.

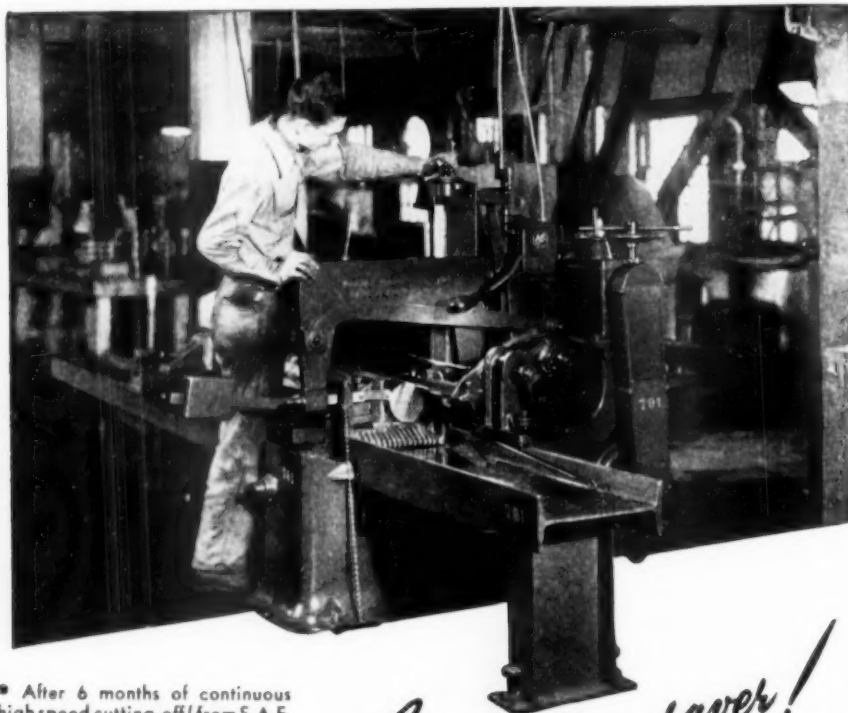
The second hand stores still stand — or lean — along So. Main St., and there I picked up a fine old muzzle loader, henceforth destined to grace the fireplace down in the rumpus room.

Called up old friends and conversed with octogenarian Otto Carlborg, under whom I served my apprenticeship — well, also a few years back. A fine and versatile mechanic and an engineer years ahead of his time, he is the embodiment of the mastery of mind over matter. He gave me a fine training, and I'm grateful. My thanks are expressed in passing my own experience to my juniors.

HAD AN EVENING STAG with old cronies at the Biltmore, and Sunday morning, attended services at Gloria Dei Lutheran Church, up on the Hill. The little chapel that played such a part in shaping my better side is gone, replaced by a grand edifice. And I was a stranger, wistfully scanning the worshippers for familiar faces. And,

(Continued on page 194)

THE TOOL ENGINEER



• After 6 months of continuous high speed cutting-off (from S.A.E. 4150 bars heat treated to 28 Rockwell S.A.E. 4150 annealed, and S.A.E. 1335), Mr. L. S. Kirby, Superintendent of the Sidney Machine Tool Co., Sidney, Ohio, reports that his new MARVEL 9A has "given completely satisfactory service and proven to be highly efficient and a great time saver."

A great time saver!
for the Sidney Machine Tool Co.

Much faster than any other accurate method of cutting off bar steel, these many-duty, all ball-bearing MARVEL Production Saws are eliminating "bottle necks" in stock rooms and cutting-off departments everywhere. Requiring no more attention than an automatic screw machine, they will cut identical lengths or slices from single or nested bars "automatically" . . . feed, measure, cut-off and stop at any pre-determined point.

No matter what your metal sawing problems, the MARVEL System of Metal Sawing supplies the best answer. The local MARVEL Metal Cutting engineer will upon request, study your requirements, and make recommendations as to methods and equipment.

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Buy from your local distributor

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Offices:
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For **EXTREME ACCURACY** in MEASUREMENT
Acme GLASS OPTICAL FLATS!



Measure in Terms of Microinches by Light Waves.

In spite of the extreme accuracy possible with light wave measurement, the procedure is very simple. Place an Acme Glass Optical Flat on your work and gage as shown in the above illustration. The exact size of the work is readily determined from the number of bands that appear.

For the best of all checks of accurately finished flat surfaces . . . to detect wear on your precision blocks . . . equip with Acme Optical Flats and Monochromatic Lamp. They allow rapid inspection of production items and assure peace of mind by furnishing a method to quickly and accurately compare your working set of gage blocks with your laboratory set.

For contract Flat Lapping send description of your requirements—
No Obligation!



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Makers of Standardized Jig and Fixture Bushings

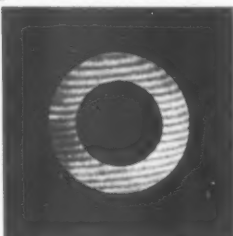
Telephone: MONroe 4122

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Chicago, Ill.

Measure in Terms of Millionths of an inch! A Test for Flatness, or an Accurate Comparator.

● Acme Optical flats and Monochromatic light furnish (in connection with your gage blocks) the lowest cost equipment capable of measurement in terms of millionths of an inch.



The straightness of these bands formed by interference of light waves reflected from the flat-lapped steel surface gives a true measure of its flatness.

PUTNAM END MILLS for **ROUGHING**
CUTS in HIGH CHROME STEEL

When you want an end mill that will dig right in and really remove stock, use a Putnam Hi-Speed End Mill. This photograph shows a one inch Putnam End Mill roughing out a slot almost one-half inch deep in a vital armament part made of high chrome steel. Putnam End Mills, when used

for roughing, remove maximum stock in minimum time. For heavy roughing cuts . . . for high speed finish milling, Putnam End Mills deliver outstanding performance. No matter what the job, a Putnam End Mill will cut faster and last longer.



PUTNAM TOOL COMPANY

2987 Charlevoix Ave. • Detroit, Michigan



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . .

that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock.

We will see that your job is set up with the right
LIVE CENTER—prompt deliveries on high priorities.

STURDIMATIC
TOOL COMPANY
5218 THIRD AVE. DETROIT, MICH.

PUNCH PRESSES
by the **SCORE-**



for
WAR PARTS

by the **MILLIONS!**
DIEBEL Hi-Speed PRESS



Turning out Diebel Stamping Presses with controllable high speeds of 180 to 550 strokes per minute at the Chicago factory. Parts are precision machined and quantity assembled to permit large scale production: lowest selling prices.

Write for Catalog

DI MACHINE CORP.

DIVISION OF DIEBEL DIE & MFG. CO.
3651 N. LINCOLN AVE. CHICAGO

mentally ironing out a wrinkle here and there transmuting silver locks to erstwhile gold, I effected restoration of a sort. For Time, the mischievous prankster, had wrought camouflage to be penetrated only by the discerning eye.

One man I knew right away, Axel Helander, for many years an engineer at Universal Winding and a master in the art of tooling for mass production. He was also, for several decades, a member of the Providence City

Council, his long tenure marked with sterling civic honesty and impeccable integrity.

Were I a member of Providence Chapter I'd consider it a privilege to nominate him for honorary membership.

WE'D MADE RENDEZVOUS at the Church, and old friends gravitated to one another. Had dinner with Bill and Mrs. Nordquist out Roger Williams Park way, coffee with Harry &

Mrs. Kullberg up on Fruit Hill, Harry, incidentally, presented me with an alligator, and I was intending to surprise (!) the wife with it, but forgot it. I imagine the Mrs. won't mind.

Sunday evening, Mr. and Mrs. Frank Carleen, over on the East Side, had prepared a fine surprise, a gathering of "the clan". Truly, Time is a master make-up artist, yet, the flash of a smile, the twinkle of an eye or a quirk of mannerism, and the years dropped away as if by magic. A few moments, and the boy and the girl came back into being. The shell may change, but the spirit, that lives on, changeless, and old friends live ever in one's heart. I look forward to our next meeting, but for now, *au revoir*.

FROM PROVIDENCE, went to Syracuse, and there again introductions came too fast for my deceptive memory. Steve Urban and Al Mitchell took me under their wings, the former taking me over to the Crouse-Hinds Company on Wednesday. There, Ray Coseo and Willard Parish took me in tow, showed me around.

Fine plant, that, with a wonderful *esprit de corps* and highly advanced tool engineering. If every plant engaged in this defense work were to work half as efficiently we'd make our industrial front impregnable overnight.

This fellow Parish is genius whose greatest endowment is extreme modesty, and Ray is a lively and progressive Tool Engineer. A moot question whether to congratulate the company on a fine personnel or the latter on a fine employer. We'll make it mutual.

LEFT SYRACUSE around midnight Wednes — uh, Thursday A. M., after a bit of worry over reservations. Al Mitchell politely offered me the lower of a section, but I thought I'd try an upper — a most interesting experience. But then, I've sailed the rough seas in my day.

Getting off at Springfield, ran into Ed Barker and Al Singer from up Canada way. Introduced the latter as Al Player, in line with my infallible system of cataloging names. (Singer, you know, for music). Then to the Kimball, where the Tool Engineers were gathering, but that's another story, to be told elsewhere.

(Continued on page 196)

"PUT IT ON THE BLANCHARD"

BLANCHARD

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ Production
- ★ Adaptability
- ★ Fixture Saving
- ★ Operation Saving
- ★ Material Saving
- ★ Fine Finish
- ★ Flatness
- ★ Close Limits

..... Especially valuable on jobs like the one illustrated.



BLANCHARD GRINDING
also cuts assembly cost

The speed with which parts can be assembled is a direct reflection of machining operations. All the flat surfaces on the pump parts, shown above, were ground on a Blanchard No. 18 Surface Grinder. This manufacturer is keeping his assembly cost low because the surfaces are flat and parallel and the finish is excellent. The accuracy needed for tight joints and correct alignment is maintained without sacrificing production.

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Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

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SIEWEK'S STAFF OF EXPERIENCED
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TO HELP YOU ROLL NEW PRODUCTS INTO
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DESIGN . . .

- **FIXTURES**
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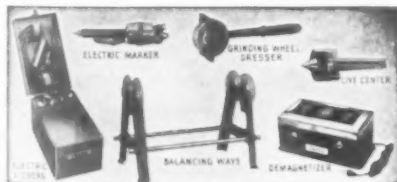
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Step **UP** War Production with **IDEAL** **LIVE** **CENTERS**



- They Rotate with the work. Reduce Set-up Time.
- Can Turn Heavier Loads Faster.
- Permit Deeper Cuts at Higher Speed.
- High precision bearings; all parts hardened and ground.



TRIPLE DUTY

3 interchangeable center pieces (illustrated above) for all kinds of centered and uncentered work.

Other War Production Speeders.

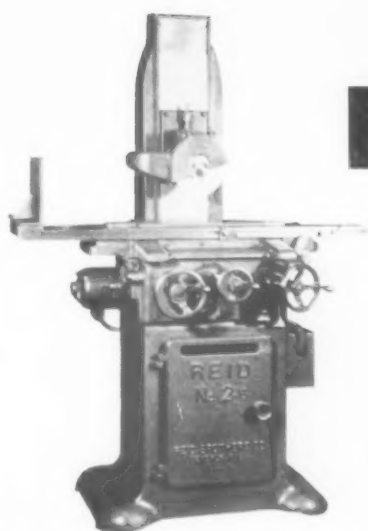
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IDEAL COMMUTATOR DRESSER COMPANY

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Sales Offices in All Principal Cities

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THE **REID** **2B** All Electric Automatic and Hand Feed Surface Grinder

THE Reid All Electric Surface Grinder is equipped with a motorized spindle, thereby eliminating all belts, pulleys, and counterweights. Table and cross slide are equipped with oil rollers, insuring greater life and proper lubrication. Table is operated with a silent chain instead of rack and pinion gears. Grinding capacity 6 x 18 x 11. Additional height if required on all standard machines. Send to Dept. O for descriptive literature.

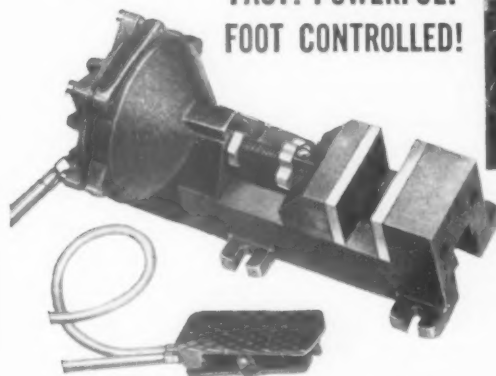
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H. LEACH MACHINERY CO.
387 Charles St., Providence, R. I.
A Reid Distributor in Every Principal City

SPEEDS PRODUCTION! CUTS TIME AND COSTS!

SPEEDY AIR VISE

FAST! POWERFUL!
FOOT CONTROLLED!



\$24

Complete with
Foot Control
Valve, Air
Hose and
Fittings

HAND FREE OPERATION!

- Foot operation leaves BOTH hands free for fast insertion and removal of work. Vise stays open or closed without constant foot pressure.

Most important vise design in years! A fast-action, hard gripping air vise that speeds production; saves time, labor and costs! Speedy Air Vise operates from air line or individual compressor, exerting a grip of 15 times air pressure! Jaw opening adjustable up to a maximum of 3 inches. Maximum travel of 1/2 inch assures rapid insertion and removal of work. Employs no piston, but instead a long-life, multiple-type diaphragm . . . eliminating friction loss, air leakage and slippage. Rugged, compact, low priced, it is the ideal vise for speeding up numerous operations.

Write At Once For Circular E-11

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WELLS SAWS

get things done!

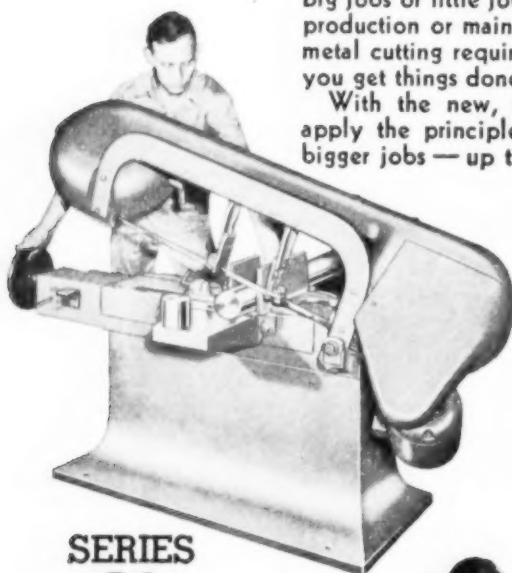
**When it comes to fast,
accurate metal cutting**

Big jobs or little jobs — tool steel or aluminum — production or maintenance work — whatever your metal cutting requirements, a Wells Saw will help you get things done.

With the new, more capable V-12 you can apply the principle of continuous cutting to the bigger jobs — up to 13 in. by 16 in. rectangular or 13 in. diameter round. The model 80 saw too, is an improved unit — redesigned for ruggedness and ability.

Put a Wells Saw to work in your plant now — you can get one quickly from your mill supply dealer or write direct.

*Wells Has Established
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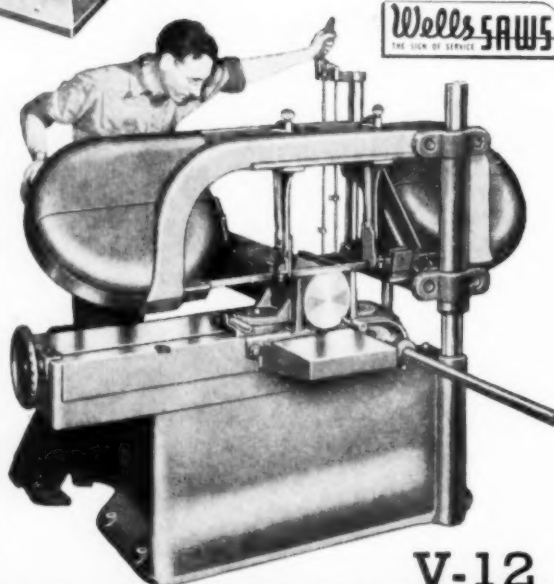


**SERIES
80**

**SPECIFICATIONS:
SERIES 80
METAL SAW**

Capacity:
Rectangle 8" x 16"
(Spec. Bowed
Guides) 5" x 24"
Rounds 8" dia.
Speeds:
Ft. per min. ... 60, 90, 130
Motor:
Specifications optional

V-12 METAL SAW
Capacity:
Rectangle 13" x 16"
Round 13" dia.
Speeds:
Ft. per min. ... 50, 90, 150
Guides Adjustable
Feed: Hydraulic-Controlled
Vise: New quick acting type
Motor:
Specifications optional



V-12

WELLS MANUFACTURING CORPORATION

**Wells METAL CUTTING
BAND SAWS**

1212 MONROE ST. • THREE RIVERS, MICHIGAN

—HANDY ANDY SAYS—

One thing almost forgot! At the conclusion of my talk at Syracuse one of the boys handed me a telegram, and for a minute I got worried, not knowing whether the Old Man wanted me back P. D. Q. or if something unforeseen had happened at home.

But it was a wire from Ray Morris, our 1st Vice Pres, wishing me success in my invasion of the East and asking me to play the Pied Piper for upper New York. Well, somebody played — the Convention is a success with S. R. O. sign up for the banquet this evening. And that will be all for now.

Handily yours,

A. S. T. E. DOINGS

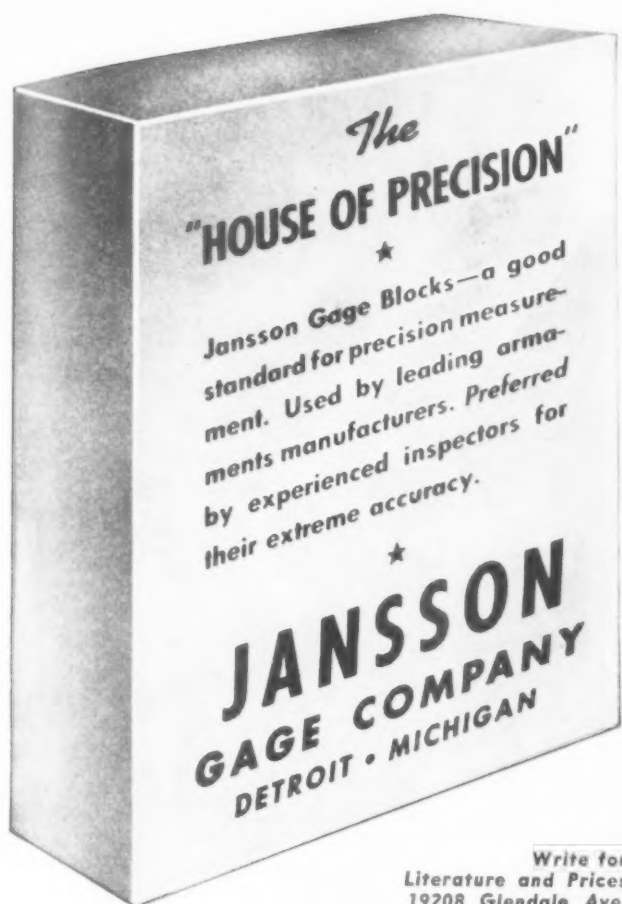
—A. S. T. E. DOINGS—

not have the gift of prophecy, but would venture to predict that this War Production conference will be one of the highlights in the history of ASTE. From every side have come comments praising the program of speakers and the subjects which they are to present. The change from three days to two and shifting the banquet to Saturday evening have met with universal approval in view of war time conditions. Many words of praise have come from manufacturing executives who will attend the sessions because they regard the conference as of outstanding educational value. It now appears that the banquet will be one of the largest ever held by ASTE with 800 or more present. Transportation difficulties present many problems and will in a measure reduce the attendance from distant points. It is anticipated that the major part of those attending will come from within a hundred miles of Springfield — showing the wisdom of selecting a city for the meeting which is in the center of a heavy membership-population area.

The National Office is, in effect, planning to render complete service at the Semi-Annual meeting. Miss Doris Pratt of the Chapter's Service Bureau, Howard Handyside, Office Manager and Frank Quigley, Membership Supervisor, will be on the job, to assist Chapter Officers, and others to develop most effective Chapter organizations.

THE END.

THE TOOL ENGINEER



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Federal Taperlock *Plastic* GAGE HANDLES

Made of plastic material, Federal Taperlock Gage Handles are lighter than aluminum or any other metal generally used for gage handles.

★ Light weight makes them more sensitive to touch and reduces fatigue caused by long continuous use. Plastic insulates gages from bodily heat helping safeguard accuracy.

★ Made to conform to dimensions accepted as standard for gages throughout the industry. They are marked for identification with the same lettering stamps used in marking metal handles.

★ The cost is low . . . about half the cost of metal handles. They are available in 6 standard sizes, any quantity and without delay.



FEDERAL TOOL CORPORATION
402 North Leavitt Street, Chicago, Illinois

NOVEMBER, 1942

Douglas 32" X 8"
PLAIN MILLER
FOR SMALL PARTS PRODUCTION

WIDE RANGE OF
SPINDLE SPEEDS
CENTRALIZED
CONTROL

EARLY DELIVERY
BY LARGE SCALE PRODUCTION

DOUGLAS MACHINERY CO. INC.
150 BROADWAY NEW YORK, N. Y.

GAMMONS OF *Manchester*



PRODUCTION TOOLS
ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN



W-S Standard Reamers with carbide tips. Tapered shank (illustrated) and straight shank types. Sizes: $\frac{1}{4}$ to $1\frac{1}{2}$.

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WE LIST as STANDARD many cutting tools formerly in the so-called "special" class. Better yet, the majority of these standard cutters is in stock most of the time. Our line is broad enough to often permit consolidation of tool orders thereby saving valuable time.

Cemented carbide tools are our *specialty*. We make them *exclusively*. Each tool is tipped with the *correct* grade of CARBOLOY best suited to do a cutting job on the metals for which the tool was ordered. (Other brands of carbide can be specified.)

You can expect and get uniform, high quality results with Wendt-Sonis tools. Catalog 142 mailed FREE upon request. Ask for it! WENDT-SONIS COMPANY, HANNIBAL, MISSOURI.

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W-S Carbide Tipped Core Drills available in straight and tapered shanks. Sizes: $\frac{1}{4}$ to $1\frac{1}{2}$.



W-S Carbide Tipped Centers available in Morse, Browne & Sharpe and Jarno Tapers.

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CENTERS * DRILLS * CORE DRILLS * COUNTERBORES * SPOT FACERS
END MILLS * REAMERS * HOLLOW MILLS * LATHE BITS * SPECIAL TOOLS

THE CRIB

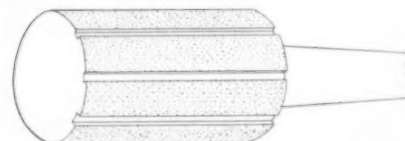
IDEAS • KINKS
SHORT CUTS

Conserving High Speed Steel

WHEN HIGH SPEED STEEL cut off tools for screw machines are ground down to the point that the ends are too short to be held in the screw machine holders, the points are inserted in soft steel and used for facing and forming jobs on secondary operations, on hand machines. Insertions are made in much the same manner as is done with cemented carbide.

It is also practical to use these salvaged tools for straight jobs on automatic screw machines. Though the life of the cut-off tool is not increased, useful performance of the valuable 18-4-1 high speed steel is stepped-up 20 to 25 percent by making use of it in the manner described on another operation.

Chip Breakers for Small Internal Grinder Wheels



SAW GROOVES FOR CHIP-CLEARANCE ABOUT $\frac{1}{32}$ "- $\frac{1}{16}$ " DEEP EVERY 30° OR 50°.

WHEN GRINDING INTERNALLY with a small wheel, a soft wheel often wears too fast. A hard wheel is apt to glaze. To help relieve glazing, cut grooves in the surface of the wheel, parallel to the axis of the wheel, with a regular hand hack saw. These grooves give the wheel chip room, and permit using a hard grade that will stand up to the job.

Increase Lapping Plate Life 500 Percent

WHEN USING LAPPING PLATES, the center of the plate becomes worn first because it is in more constant contact with the work than the edges.

(Continued on page 200)

What's a good HOTEL IN DETROIT?



We're glad you asked . . . because there's more than one good hotel in in this city. We could name six or eight outstanding hotels offering fine accommodations at comparable rates.

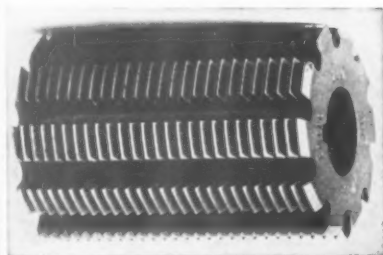
Well then, what hotel should you stop at in Detroit? We say you'll like any of our leading hotels . . . but we ask that you give us a try.

We think we have a little extra to offer. It's difficult to describe this "little extra" but perhaps our long standing slogan can say it for us—

Aglow with Friendliness
HOTEL FORT SHELBY
DETROIT

J. E. Frawley, General Manager

MULTIPLE THREAD MILLING HOBS



—in any thread system, any thread angle, any thread form. Inch or metric scale. Left or right hand threads. Free from distortion. Up to 7" O.D., and 4" thread length for internal or external threading.

**TOLERANCES: FOR THREAD DEPTHS AND PITCHES
LESS THAN 1/10,000 INCH**

All hobs demagnetized relieving chips immediately.

These hobs precision cut by methods used for more than 25 years, eliminating any discrepancy between thread form and form of finished work, thus speeding up production without sacrificing accuracy. Full details upon request to Dept. T.

DELIVERY TIME: FROM 1 WEEK ON

U. S. MACHINE TOOL MFG. CORPORATION
DEPT. T

100 So. 6th Street, Terre Haute, Ind.

For quick action call plant at Clinton, Indiana, Telephone 85

Columbia TOOL STEEL

REMEMBER—

Columbia Sales-Service men are available and ready to assist users of our products in securing utmost war production.

They will gladly give all help possible.

*It pays to use
Good Tool Steel.*

COLUMBIA TOOL STEEL COMPANY

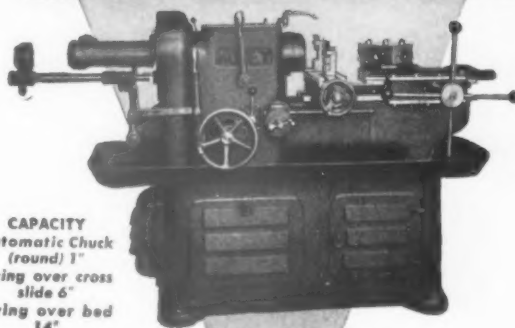
ARTHUR T. CLARAGE, PRESIDENT

GENERAL OFFICE AND WORKS

500 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

for ECONOMY—for HIGH SPEED PRODUCTION

The MOREY 2G Back-Geared TURRET LATHE Timken Bearing Self-Locking Turret and Infinite Spindle Speeds



CAPACITY
Automatic Chuck
(round) 1"
Swing over cross
slide 6"
Swing over bed
14"

Thousands of the MOREY 2G Turret Lathes are saving money with no sacrifice of high speed production. Economy features: Back Gears are instantly thrown in through extra large Twin Disc Clutch—Full advantage from high speed and carbide tools—Vibrationless precision and an infinite variety of spindle speeds for every job—Timken bearing—Self-locking turret. Can be furnished with tooling.

Ask for Circular 629 for full details

MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK, N. Y.

YOUR SAWING JOBS PRE-TESTED

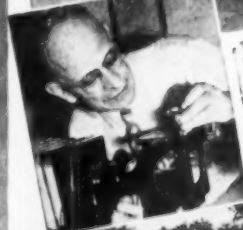
A typical case: Heyl & Patterson, Inc. of Pittsburgh, Pa. sent a 6 1/2" bronze bushing through our Laboratory.

55 separate cuts were tried
4 different width saws
40 speeds
3 lubricants
Several pressures
Various angles

Result: Use a DoAll 8 pitch band saw, 2 temper, raker set, 1" wide. Tilt table 10 degrees and run at 100 f.p.m.



FIRST AND ONLY SAW RESEARCH LABORATORY OPEN TO INDUSTRY



This department contains different size and style sawing machines. The Photomicroscope shows grain structure of your metal in minute detail. Exterior view of Saw Research Laboratory.



A clinic where hundreds of intricate sawing jobs are handled. This brand new building, with the most modern scientific apparatus is manned by top-ranking engineers. They determine the fastest and easiest method to saw any kind of metal, alloy, Masonite, magnesium, plymetal, etc. with maximum savings of time, metal and saw blades.

Have You a Tough Job?

Send along the actual job for a series of tests by our experts. They will send you promptly a detailed written report with their findings. No cost or obligation.

DoAll BAND SAWS

Each 100-ft. coil comes in slotted metal box. Complete line contains 48 different styles, 1/8 to 1" wide.

These hard-toothed little fellows last longer and are doing work in plants everywhere in 1/2, 1/4 and even 1/8 the time of former methods. The finish is so smooth that further machining is unnecessary.

SEND FOR 32-PAGE BOOK

Contains illustrations and facts about actual performance records of DoAll Saws.

THE DOALL COMPANY 1211 Thacker St., Des Plaines, Ill.

Associated with Continental Machines, Inc.
Minneapolis, Minn.

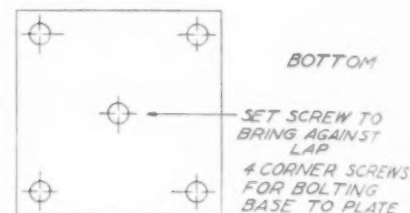


Pat. No. 2,255,577 Des. No. 127,313 Other Pat. Pending

THE CRIB

(Continued from page 198)

By fastening a base under the lapping plate and placing a set screw in the



center of the bottom plate to bear against the lap it is possible to dome the lapping plate a few tenths, which will increase its life about five times.

Fan Clears Chips From T-Way Cutter

Using a T-way cutter on a vertical milling machine, a fan has been used successfully to clear chips cut from cast iron with as high as 30% steel content. Feed is five to six inches a minute. In milling an ordinary slot, as with the tulip end-mill which precedes the operation with the T-way cutter, chip clearance is not a serious problem. But in the T-way, as it is formed, chips tend to catch under the lip, jamming the cutter.

The fan is rigged up at the upper end of a tube which forks to both sides of the cutter, drawing the chips away as they are formed. Clearance of the hot chips from the tool helps cooling, in that no coolant is used. The draft of air is also helpful in this respect. Tools that have burned blue on this job may be expected to be comparatively cool after the fan is installed.



THE TOOL ENGINEER will pay \$5.00 for your kinks or shop short-cuts published in this column. Brief, practical articles should be accompanied by sketches or photos.

Now! A Complete Manual on
MARKING DEVICES
For Every Industrial Use

J.S. H. MATTHEWS & CO.

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Plant Managers! Superintendents! Purchasing Agents! Production and Plant Engineers! Here's a book that will give you the answers to your marking problems. It contains hundreds of illustrations, with concise descriptions of Marking Devices for every Industrial Marking application. Yours for the asking . . . request a copy on your letterhead today!



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A Plastic "Wrap"
FOR AN EXCEPTIONAL TAP

Threadwell
TAPS OF DISTINCTION

One of the many things that Threadwell has done to insure better performance from taps is to pack every high speed tap under 1/2" size in a transparent plastic tube as shown.

THREADWELL TAP & DIE COMPANY
GREENFIELD, MASSACHUSETTS
FOUNDED 1902

SALES AGENTS: Canada - BRIDGE MACHINERY COMPANY, Montreal; England - SKYLARK, LTD., London

"PROTECTS THE TAP EN ROUTE"

"EASY TO STORE AND HANDLE"

"YOU CAN SEE THE SIZE WITHOUT UNWRAPPING"

"INSPECTED AND SEALED BY THE FACTORY"

24 hours--
..every day
with
SCHAUER
Speed Lathes

SCHAUER Speed Lathes with Sjogren Chuck — increases production of finished screw machine parts up to 1 3/8" diameter.

SCHAUER Speed Lathes are made to withstand the strain of twenty-four hour production: — all wearing parts are of hardened tool steel — machine ground for precision fit — and assembled by experienced men. For faster, more economical finishing operations of machine parts use SCHAUER Speed Lathes — send for Catalog No. 420.

"the originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY
2064 Reading Road Cincinnati, Ohio

Send for Valuable Booklet

Forgings For All Industries
Rough Turned or Finished Complete



Composite Die Sections
Extrusion Tools
Crankshaft Forgings
Gear Forgings
Die Casting Dies

Rings, Discs, Blocks,
Shafts, Hubs, Bars,
and Special Shapes.
Tool Steel of all
Makes

S.A.E. Specifications

STAINLESS & COPPER FORGINGS

May we Serve You?

AJAX STEEL & FORGE Co.

205 ADAIR STREET

DETROIT, MICHIGAN

HOW TO SAVE TIME AND MATERIAL IN CUTTING-OFF OPERATIONS

INSTRUCTION MANUAL

When you have used this much of an ordinary cut-off blade

Today's Important Lesson

— you must grind away all this to get new back clearance

— and then you repeat the same waste again — AND AGAIN!

With **EMPIRE'S** LUERS PATENTED **CUTTING-OFF BLADES** you can use **THIS** entire length in actual production

without wasting material and without wasting time in useless grinding.

The T Series is tapered the entire length of the blade. A constant back clearance is thereby maintained regardless of the number of regrinds on the face (the only place where regrinding is necessary).

By using cut-off blades that eliminate this grinding for back clearance you not only save much valuable time which can be put to better use, but you also stop the waste of critical metal. You help to conserve steel.

*Blades, both tapered and parallel on the longitudinal cutting width, carried in stock

EMPIRE TOOL COMPANY'S LUERS PATENTED **CUTTING-OFF BLADES** are now in use on all these standard machines

Acme Gridley
Bardons & Oliver
Brown and Sharpe
Cleveland B Vertical
Cone Automatic
Davenport

Foster
Gisholt
Greenlee
Gridley
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Midland
Millholland

Morey
National Acme
New Britain Automatic
Simmons
South Bend
Warner & Swasey

The Blades that reduce friction

EMPIRE Tool Co.

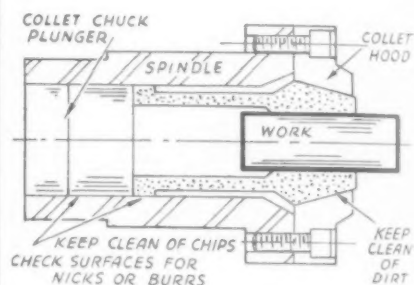
8776 Grinnell Ave.
Detroit, Mich.

Better Collet Performance

from "Blue Chips"
published by Warner & Swasey

LIKE MOST accurate mechanisms, collet chuck parts are accurately finished by grinding to close limits so the work can be gripped firmly to run true with the center of the spindle. To avoid run out of the work piece, moving parts of collet chucks must also have minimum amounts of clearance.

Frequently a collet sticks as a result of dirt, or metal chips from the job, becoming lodged between the bore of the spindle and the heel of the collet or the collet chuck plunger. To keep a collet operating smoothly, therefore, it is a good practice to be sure that these sliding surfaces are kept free from chips at all times.



In the event that chips become lodged in the collet chuck mechanism, a check should be made for nicks or burrs in the collet or plunger that might resist the free movement of the collet mechanism. At the same time, the careful operator makes certain that the taper between the collet and the hood is kept free from dirt. Any dirt lodged between collet and hood acts as an abrasive, destroying the precision of this accurate holding device.

Older collets sometimes lose their "spring" and do not release as readily as newer units. These collets, if necessary can be respread by heat treatment to provide sufficient pressure for releasing the collet when the collet chuck mechanism is opened.

The correct size of collet or collet pads should be used at all times for the diameter bar stock to be gripped. A collet too small or too large in bore grips the work at one point only instead of over the entire gripping area. Greater pressures in these cases are generally needed to hold the work. As a result, additional wear may be experienced on the collet chuck parts.

Rotorex GRINDER
FOR ALL TOOLS.

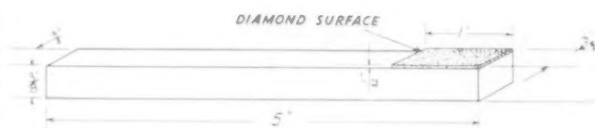
PROMPT DELIVERY
by LARGE SCALE PRODUCTION



DOUGLAS MACHINERY CO.
150 BROADWAY NEW YORK, N. Y.

5 to 10 Times More Wear!
WITH

**TUNGSTEN CARBIDE
DIAMOND METAL HONES**



THREE DIAMOND GRIT SIZES

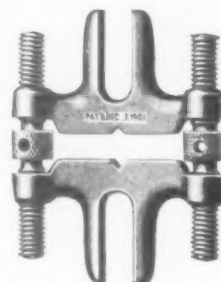
1. COARSE — 100 GRIT DIAMOND.
2. MEDIUM — 150 GRIT DIAMOND.
3. FINE — 250 GRIT DIAMOND.

Used for stoning carbide tools and dressing small angles on abrasive and diamond wheels, these hones will outlast the bakelite diamond hones from 5 to 10 times. Fast cutting, they are difficult to harm in ordinary use and use kerosene or light oil as a lubricant. To resharpen, the diamond face is lightly brought in contact with a silicon carbide wheel for about 30 seconds to one minute. The purchase of one will sell you on their value.

GENERAL TOOL & DIE COMPANY
555 PROSPECT ST. • EAST ORANGE, N. J.

In Perfect Balance!

No. 100
Capacity
1/8 to 1 1/2
inches
\$3.00



No. 99
Capacity
1/2 to 2 1/2
inches
\$3.25

Especially designed for cutter grinders, because adjustment is made with two right and left screws. It is convenient and handy in a number of ways and one dog can be used in place of three or four as formerly required.

This dog is so designed that you can get close up to the face plate when working on small work.

WRITE FOR CATALOG E-42

THE READY TOOL COMPANY

585 IRANISTAN AVE.
BRIDGEPORT CONN.



**UNIVERSAL
FIRST COMPANY
IN AMERICA TO WIN COV-
ETED 20% BOND FLAG**

When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

But we're even more proud of the big volume of precision built collet chucks we're turning out daily to help America's arms production.

The Universal collet chuck shown here has ground threads, ample room for tool feed out and is ideal for holding end mills, keyway cutters, drills, etc. Write for facts.



UNIVERSAL ENGINEERING CO.
FRANKENMUTH • MICHIGAN

THE PASSING PARADE

The Ever-Changing Scene in Mass Manufacturing



• **RALPH E. FLANDERS**, president of Jones and Lamson Machine Company, Springfield, Vermont, has been appointed to a board which will assist **JAMES F. BYRNES** in controlling the war-time economy of the nation. President of this concern since 1933 and an administrator of machine tool priorities in the OPM, Mr. Flanders will be one of two representing man-

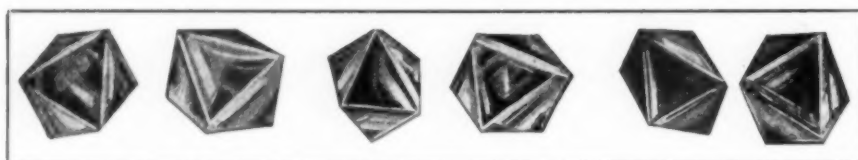
agement on this board.

• **GEORGE A. BRAMAN**, plant engineer of the Fitchburg Grinding Machine Corporation was given a farewell party by more than 50 co-workers on the eve of his enlistment in the Construction Corps of the Navy.

• **JOHN C. CHAFFEE**, vice president of Brown & Sharpe Manufacturing Company of Providence, R. I.,

was elected president of the National Machine Tool Builders Association at the Association's annual meeting in New York. **WALTER W. TANGEMAN**, vice president of the Cincinnati Milling Machine Company, was elected first vice president of the Association. **FRED H. CHAPIN**, president, National Acme Company, Cleveland, was elected second vice president, and **DAVID AYR**, president of the Hendey Machine Co. at Torrington, Conn. was elected treasurer. New members of the board of directors of this association are: **JOSEPH L. TRECKER**, vice president of Kearney & Trecker Corporation of Mil-

(Continued on page 206)



Norton



Excello



J.&L.



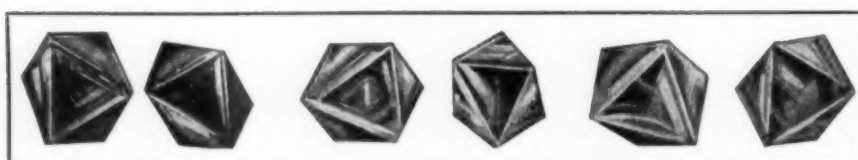
Landis



These rugged diamond tools stand up under war time production. Carefully selected stones plus a firm nickel alloy setting insure full value and satisfactory truing performance on all grinding wheels. Both standard tools and special thread grinding diamonds carried in quantities for quick shipment. Write for information and circulars.

F. F. GILMORE & CO.

112 Dartmouth St. • Boston Diamond Toolmakers
2834 East Grand Blvd. • Detroit



ARMY-NAVY "E" AWARDS GIVEN RECENTLY

AXELSON MANUFACTURING COMPANY, Santa Ana, California.
EX-CELL-O CORPORATION, Detroit, Michigan.
GENERAL ELECTRIC COMPANY, Schenectady, New York.
GISHOLT MACHINE COMPANY, Madison, Wisconsin.
INDEPENDENT PNEUMATIC TOOL COMPANY, Aurora, Illinois.
R. K. LeBLOND MACHINE TOOL COMPANY, Cincinnati, Ohio.
NEW BRITAIN-GRIDLEY MACHINE DIVISION, New Britain, Conn.
PUTNAM TOOL COMPANY, Detroit, Michigan.
SUNDSTRAND MACHINE TOOL COMPANY, Rockford, Illinois.
WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, East Pittsburgh, Pa.

RECENT TREASURY AWARD MINUTE MAN FLAG

GENESSEE TOOL COMPANY, Fenton, Michigan.



(Bur)



(Bur)



(File)



(Bur)



(Bur)

MARTINDALE ROTARY FILES and BURS

are:

1. Made in 300 sizes.
2. Usually shipped within 6 days after orders are received.

Write for 12-page Bur Bulletin

THE MARTINDALE ELECTRIC CO.
1421 Hird Ave. Cleveland, Ohio

ZAGAR INDEXING AND HOLDING FIXTURES

really

**DO STUNTS
... SAVE TIME
AND MONEY**

*Get new, well illustrated
bulletin; shows how to cut
screw machine and other
costs and jump production.*

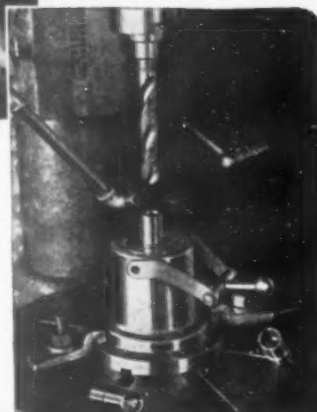


Above: Special Adaptation. Large bore enables 2" Zagar Indexing Fixture to hold heavy part for milling key slots. Screw replaces usual collet. Great accuracy, increased output.

At right: Zagar Holding Fixture holds hollow plug rigidly for drilling, cutting screw machine time 30%.

★ ★ ★

Get our new Bulletin E-1



ZAGAR TOOL, INC.
23880 Lakeland Blvd. Cleveland, Ohio

MAKE YOUR TOOLS Last Longer!

Taps and reamers are often scrapped sooner than necessary because of poor performance, when, as a matter of fact, the real trouble is that the spindles are out of alignment with the work.

Lengthen the life of your tools by using a Ziegler Floating Holder, which automatically compensates for spindle misalignment. It makes tools last longer, thereby cutting down tool costs.

Try it in comparison with any other tool holder on the market and see for yourself how much better work it does!



W. M. ZIEGLER TOOL CO.

1920 Twelfth St

Detroit, Mich.



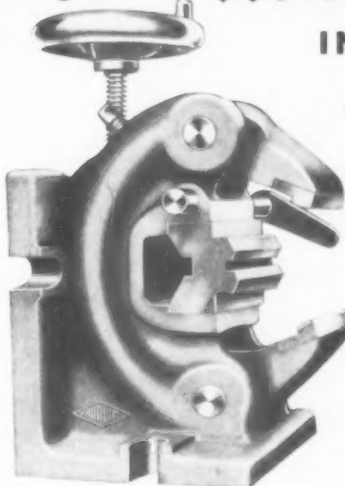
Write for
CATALOG

FLOATING HOLDER
for Taps and Reamers...

A Natural...

IN ANY SHOP

*Self Centering
Shaft Vise*



This modern machine vise is a "natural" because it just naturally is an asset to any machine shop. For machining slots and keyways in shafts or spindles, $\frac{3}{8}$ " to $3\frac{1}{8}$ " diameter—suitable for horizontal or vertical mounting. Setting of vise remains unaltered for

all work diameters—insures accurate radial cuts. Hardened V jaw reversible in vise—equal movement of two jaws locates shafts correctly in V jaw.

Base size 8" x $7\frac{1}{4}$ ". Approx. wt. 80 lbs.

Write for circular.



**THE PRODUCTO
MACHINE COMPANY**

990 HOUSATONIC AVE., BRIDGEPORT, CONN.
3017 MEDBURY DETROIT, MICHIGAN



VOLUME and SPEED

Combined with Accuracy!
American Industry's matchless



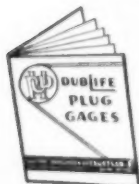
formula
is
EFFICIENTLY
Supported by

DUBLIFE

REVERSIBLE

PLUG GAGES "UPPCO LAPPED"

Double life of Gages for utmost Precision Service! New plug end, "Go" or "No-Go" ready when other end becomes worn. Change easily, quickly made. Tapered bronze collet locks plugs firmly in hexagonal handle. Saves time! Saves LOSSES!



ASK FOR CATALOG—Send for Catalog of full line of DUBLIFE. Specify DUBLIFE Gages and UPPCO finish. Other Gages of American Gage Design also shown. Write.

ORIGINATORS and exclusive manufacturers of DUBLIFE Gages and UPPCO Finish.

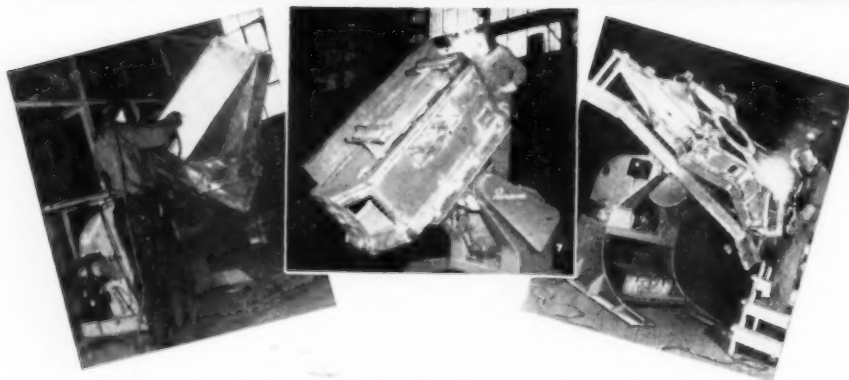


UNITED PRECISION PRODUCTS CO.

3517 W. Belmont Ave.

CHICAGO, ILL.

Ransome. Welding Positioners for Greater Production



Left. Many-angled piece positioned for all downhand welds.

Center. Heavy machine bases are of welded construction.

Right. A complicated weldment easily handled on a positioner.



CAPACITIES FROM 2500 LB. HAND-OPERATED TO 20 TON MOTOR OPERATED

INDUSTRIAL
DIVISION

RANSOME MACHINERY CO.

DUNELLEN
NEW JERSEY

PASSING PARADE

waukee, MR. TANGEMAN, and MR. CHAPIN.

• A. O. THALACKER has been appointed as general manager of the Detroit Rex Products Company.

• WILLIAM L. BATT, president of the S. K. F. Industries of Philadelphia, and CHANNING R. DOOLEY, manager of Industrial Relations of Socony-Vacuum Oil Company of New York, have been named as management representatives on the Federal Committee on Apprenticeship which will advise the Federal Security Agency and the War Manpower Commission.

• CLARENCE E. SHIPLET, superintendent of erection and machining at the Louisville Division of the Westinghouse Electric and Manufacturing Company, has been awarded the Westinghouse Order of Merit for distinguished service.

• JOHN L. MARSH, MARVIN H. CRAWFORD, and CLEMENT J. WOLF, Bell Aircraft Corporation employees, recently received recognition from the War Production Board for shop improvement ideas they had perfected.

• C. H. SPECK has been recently appointed head of Material Conservation for Management of Boeing Airplane Company, Wichita, Kansas.

• MR. A. C. KRACKLAUER and MR. W. J. KRACKLAUER, president and sales manager respectively of the Sparkler Filter Manufacturing Company at Mundelein, Illinois, have been honored by the James F. Lincoln Arc Welding Foundation of Cleveland, Ohio, in its \$200,000 nation-wide industrial study on arc welding.

• A. E. SHELTON, formerly works manager of the Stinson Division of Vultee Aircraft, Inc., has been promoted to the newly created position of division manager, it was recently announced.

• FRED C. TANNER, vice president and former manager of engineering sales, has been advanced to the position of general manager of Federal Products Corporation.

• HARRY F. BOE, manager of Westinghouse Electric and Manufacturing Company's District Repair and Manufacturing Department, has been elected to the rank of vice president. H. V. PUTMAN, manager of Westinghouse Electric Transformer Division, was also elected to the rank of a vice president.

(Continued on page 208)

BOKUM TOOLS

Reduce Cutting Time



STYLE A — for general boring



STYLE B — for facing and bottoming



STYLE C — for internal threading

These specially designed tips of super high-speed steel, securely screwed on bars, make precision boring easy, speedy, and economical.

Smaller sizes are made in one solid piece.

Send for folder A-1139.

For carbide-tipped tools ask for folder A-398.



BOKUM

TOOL COMPANY

14775 WILDEMERE AVE. DETROIT, MICH.

THE UTILITY SLEEVE

Removable Taper Shank

TOOL DRIVER

CUTS SMALL
TOOL COSTS

SIMPLE,
POWERFUL,
POSITIVE,
ACCURATE.



For:
TAPS
DRILLS
REAMERS
END MILLS
COUNTERSINKS
CENTER DRILLS
COUNTERBORES
WOODRUFF CUTTERS
TAPER PIN REAMERS, ETC.

THE J.C. GLENZER COMPANY

Detroit Michigan



*Will do 67%
of all Straight Dressing Jobs*

67% of all straight wheel dressing jobs can be done efficiently with an American "A-20" Cluster Tool. Made of 20 carefully selected diamonds, arranged in four layers of five stones each, set in a special, low temperature matrix, with each stone so spaced that there will always be several sharp cutting points in contact with the wheel during dressing operations. Stones are all permanently mounted, no re-setting required.

Compare our price with what you have been paying for "Cluster Tools" . . . we promise performance beyond your expectations. Improved production facilities, new methods of setting and volume sales permit us to price the American "A-20" at \$15.00 F.O.B. Detroit. Price includes any standard type mounting . . . specify your choice when ordering. Price subject to change without notice.

American

DIAMOND TOOL & GAUGE CO.

15926 WOODINGHAM • DETROIT, MICH.

★ ★ ★ ★
Another forward step in clamping operations! In fact, four forward steps—each contributing a definite speed factor in production.



★ MIDGET CLAMP. Improved Model. Toggle bar strengthened, with bolt retainer now integral with bar. Spindles uniformly centered. Exceptionally practical in holding small parts where heavy clamping pressure is required. Spindle has rubber cap.



★ PARALLEL CLAMPING PLIERS. The extended parallel jaws aid clamping efficiency by exerting pressure uniformly over greater area. Particularly effective in gluing plywood. Two-spindle adjustment. Already extensively used in aviation industry on plywood gliders and training planes.

★ L-CLAMP. Designed for clamping small parts, either in assembly or production jobs. For use in limited spaces or where large throat capacity is required, such as in the clamping of L-sections in aircraft construction. Handles at right angles to clamping position.



Perhaps YOUR plant can make advantageous use of one of these or other Knu-Vise features. Ask for a demonstration in your plant.

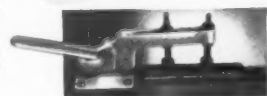
KNU-VISE

INCORPORATED

IMMEDIATE DELIVERY

2214 Eighth St. • DETROIT, MICH.
4328 San Fernando, Glendale, California

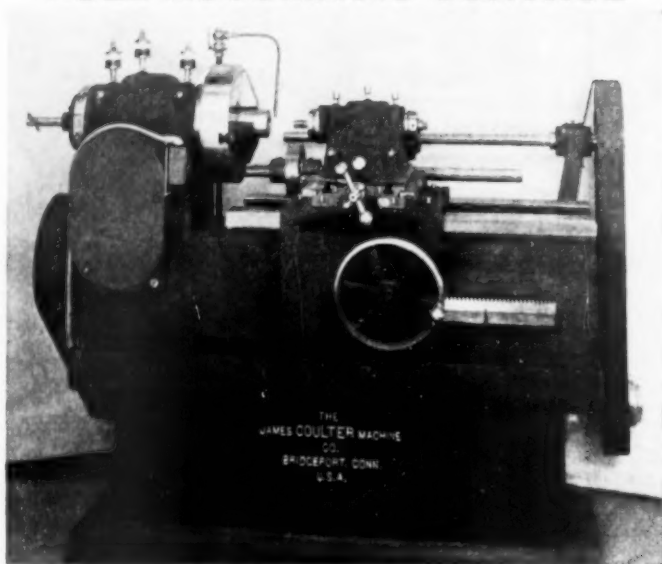
★ ★ ★ ★
4 More
**KNU-VISE
FIXTURES**
*To Speed Up
Your Clamping
Operations*



★ U-SHAPED TOGGLE BAR. Permits simultaneous clamping of many parts regardless of their thickness. Two spindles with rubber caps, adjustable horizontally and vertically, are pre-set at required locations and remain in these fixed positions during continuous operations. Handle in horizontal position when closed.

PRECISION THREAD MILLER

FULL AUTOMATIC CONTROL



INTERNAL OR EXTERNAL RIGHT OR LEFT — UP TO 7 INCH DIAMETERS
COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U. S. A.

"PRECISE"-35 GRINDER AND MILLER

Electric!

35,000 LOAD RPM

35 OUNCES

1/7 H.P. FREE AT SPINDLE

Speed Counts

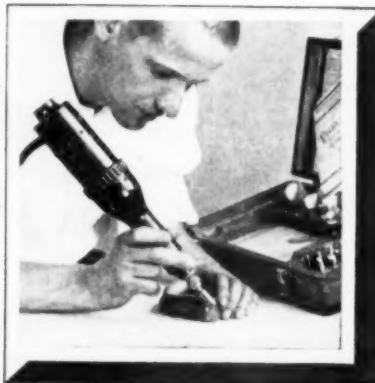
GRINDING

On all materials with mounted wheels
from 1/16" to 1" diameter x 1/2" face.

MILLING

In nonferrous material with "PRECISE"
Cutters up to 3/8" diameter x 1" face.

Now available in AC/DC 110 or 220 Volt. Direct Drive. 100% Shockproof. No Vibration.
Capacity 8 hours continuous run. No undue heating. Hand or Machine-mounted Operation.



PAUL F. HERMANN COMPANY
3400 FORBES ST. PITTSBURGH, PA.

PASSING PARADE

dent by the Board of Directors.

• **GEORGE KELLER MACHINERY COMPANY** has been appointed as distributor in the Buffalo territory for Van Norman Milling Machines manufactured by Van Norman Machine Tool Company of Springfield, Massachusetts.

• **W. E. LOY** of Athol, Massachusetts, sales manager of the Union Twist Drill Company, has been appointed to the War Production Board, division of drill and reamer industry.

• **L. A. LINCOLN** of the S. W. Card Company, **L. G. MILLAR** of the Greenfield Tap & Die Company, **CHARLES M. POND** of Pratt & Whitney, and **J. E. WINTER** of Winter Brothers have been appointed to the War Production Board, division of tool and die industry.

• **C. W. BETTCHER** of Eastern Machine Screw Corp., and **JAMES W. SNEYD** of the Geometric Tool Company, have been appointed to the War Production Board, division of die head, chaser and collapsible tap industry.

• **ERNEST C. PUTNAM** and **E. REANEY** of the O. K. Tool Company, have been appointed to the War Production Board, division of milling cutter and form tool industry.

• **MARSHALL JARVIS** of the Charles L. Jarvis Company has been appointed to the War Production Board's rotary file and burr industry.

• **W. A. SCHLEGEL** of the Metallurgical department, The Carpenter Steel Company, was awarded the Henry Marion Howe Gold Medal by the American Society for Metals during its convention at Cleveland.

• **MR. JOSEPH DE JURE** has been appointed as representative for the American Swiss File & Tool Company for their eastern Pennsylvania, Southern New Jersey, Delaware, Maryland and District of Columbia territory. Mr. DeJure will make his headquarters in Philadelphia.

• The following men have been appointed to the Abrasive Industry Advisory Committee to the War Production Board: **ARTHUR BATTS**, president of the Carborundum Company; **J. H. BYERS**, president of Abrasive Products Company; **B. R. COLE**, general manager, Phosphate Division, Monsanto Chemical Company; **A. T. DALTON**, secretary, Chicago Wheel & Manufacturing Company; **E. B.**

(Continued on page 210)

END TAPPING BOTTLENECKS

with **Ettco-Emrick**

HIGH-SPEED, SENSITIVE

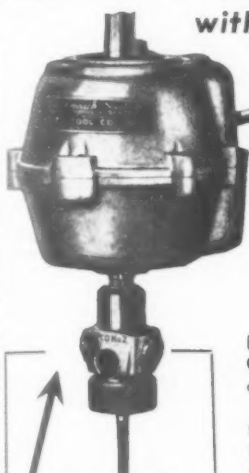
TAPPING ATTACHMENTS

If your tapping machine capacity is not adequate to your tapping needs, put your drill presses to work. Ettco-Emrick Attachments clamped to their spindles will turn them into high-speed, sensitive tappers. **Quill Clamps** assure rigid mounting on any press.

These Attachments come in 7 sizes for No. 0 to 1" taps. They are time-tested and proved. With them you can tap as fast and accurately as machine tapping can be done.

Ettco-Emrick design features which make possible high-speed tapping with hair-trigger sensitivity are all covered in BULLETIN No. 2. Write for a copy today.

ETTCO TOOL CO., Inc.
586 Johnson Ave. Brooklyn, N. Y.
Detroit Chicago



**ETTCO-EMRICK
TAP CHUCKS**

Taps are sure to be properly inserted in these chucks because the grip is visible. 5 sizes for No. 0 to 1" taps. Details in Bulletin No. 6. Collet type chucks are available for No. 6 to 3/8" taps.

MAKERS OF **Ettco-Emrick** DRILL CHUCKS • TAP CHUCKS
MULTIPLE TAPPING AND DRILLING HEADS
TAPPING ATTACHMENTS • TAPPING MACHINES

In War, as in Peace...

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

REPRESENTATIVES AND DISTRIBUTORS

BROOKLYN, N. Y., Belmont Smelting & Refining Works.
ANSONIA, CONN., Jackson Associates.
BOSTON, MASS., Jackson Associates.
CHICAGO, ILL., Sterling Products Co., Inc.
CLEVELAND, O., Die Supply Co.
DALLAS, TEX., Metal Goods Corporation.
DETROIT, MICH., Castaloy Corporation.
HOUSTON, TEX., Metal Goods Corporation.
KANSAS CITY, MO., Metal Goods Corporation.
LONDON, ENG., Mining & Chemical Products, Ltd.
LOS ANGELES, CAL., Castaloy Corporation.
MILWAUKEE, WISC., Harry C. Kettelson, Inc.
MINNEAPOLIS, MINN., Northern Machinery & Supply Co.
MOLINE, ILL., Sterling Products Co., Inc.
MONTREAL, CAN., Dominion Merchants Ltd.
NEW ORLEANS, LA., Metal Goods Corporation.
ST. LOUIS, MO., Metal Goods Corporation.

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET

NEW YORK, N. Y.

AMES

UPRIGHT GAUGE No. 13

The model best suited for general testing and measuring in thousandths inches or less. Base is 8 inches square. Capacity for measuring to 6 inches. Weight 17 pounds.

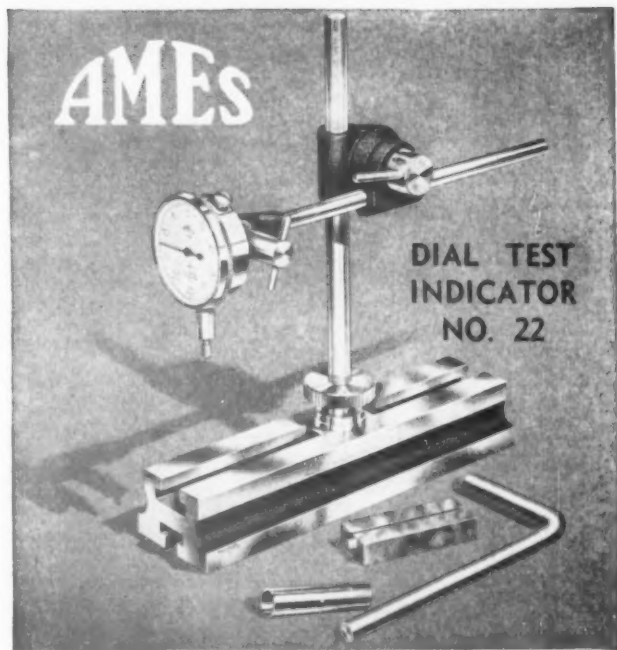
Price
\$30.00



B. C. AMES CO., Waltham, Mass.

AMES

DIAL TEST INDICATOR NO. 22



Ideal for inspectors, tool-makers, scrapers and assemblers to test in thousandths, half-thousandths or tenths of thousandths inches. Adjustable to all positions and used in tool holders of various machines. Priced at \$30.

Send for bulletin

B. C. AMES CO., WALTHAM, MASS.

LUFKIN MASTER PLANNER GAGE



THE TOOL OF 101 USES

The design and precision construction of the Lufkin Master Planer Gage make it not only a better Planer Gage, but make it available for scores of jobs for which ordinary gages are unsuited. This tool may be used with gage blocks to set up work on a surface plate; with a sine bar to set cutting tools; with an Indicator for transferring measurements, and in many other practical ways. You really get more than a Planer Gage when you buy this Lufkin tool. Write for free tool catalog.

**BUY THROUGH YOUR
DISTRIBUTOR**

LUFKIN

SAGINAW, MICHIGAN • New York City
TAPES • RULES • PRECISION TOOLS

PASSING PARADE

GALLAHER, Clover Manufacturing Company; W. A. HARTY, president of the Exolon Company; C. N. JEPPSON, president of the Norton Company; H. D. WILLIAMS, treasurer and general manager of the Washington Mills Abrasive Company; J. KUZMICK, Abrasive Wheel Department, Manhattan Rubber Manufacturing Div. of Raybestos Manhattan, Inc.; S. B. LEISHMAN, president of the Gardner Machine Company; T. J. McINTYRE, vice president of Macklin Company; W. L. MC KNIGHT, president of the Minnesota Mining & Manufacturing Company; J. W. MC LEAN, president of the Abrasive Company; A. V. PARKER, president of General Abrasive Company; and P. R. SHUTTLEWORTH, vice president of Allison Company.

• **THE INDEPENDENT PNEUMATIC TOOL COMPANY** announces new locations of its branch offices at Boston, Massachusetts and Birmingham, Alabama. The Boston office is now at 78 Brookline Avenue and MR. VANCE G. TURNER is the new manager. The Birmingham office has been moved to a new location at 1411 North Third Avenue.

• **BOKUM TOOL COMPANY** of Detroit announces the location of its new home at 14775 Wildemere. This marks the third expansion for the company since 1931.

• **RUDEL MACHINERY COMPANY, INC.** has been appointed as representative of the Blanchard Machine Company for the eastern part of New York State, Northern New Jersey, and the entire State of Connecticut. Offices will be in New York and Hartford.

• **J. S. ALLEN**, former general sales manager of the Fostoria Screw Company at Fostoria, Ohio, has been appointed vice president in charge of sales with headquarters in Detroit.

• **A. J. MILLER** has been transferred from the Detroit office of the Norton Company to the job of field engineer for that territory, it was recently announced.

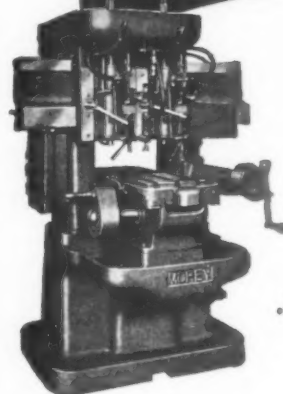
Died

• **EDWARD H. THOMAS**, manager of the New York office of Farrel-Birmingham Company, died at the Presbyterian Hospital in Pittsburgh on Sunday, September 13, following a heart attack.

(Continued on page 212)

Preloaded Precision Bearings for Spindles

MOREY 12M HIGH-SPEED VERTICAL PROFILER and MILLER



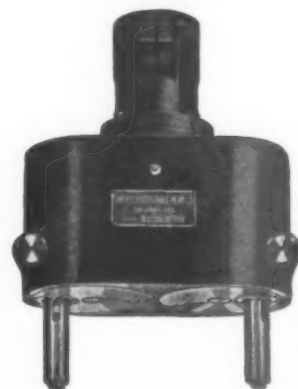
Two spindle
or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

U S HEADS STANDARD SINCE 1915



30 DIFFERENT STANDARD SIZE
ADJUSTABLE DRILL HEADS,
CAPACITIES UP TO 1 1/2" DRILLS

SEND US YOUR B/P'S

All Types of Fixed Center Heads

UNITED STATES DRILL HEAD CO.
Cincinnati, Ohio

It isn't that we need
your business.

Rather, it is that you
need our help.



NATIONAL TOOL SALVAGE CO.
3816 Beaubien St.,
Detroit, Mich.

LESS OPERATIONS AND FAR BETTER WORK

WITH A

GATCo

ROTARY PILOT BUSHING

Pilot and bushing fits with a PUSH fit,
therefore a perfect bore

**ROUND-CHATTERLESS-
SMOOTH**



AS A
WATCH

GATCo Rotary jig and pilot bushing is
built for core drilling, diamond boring,
turret tool piloting, piloting hollow mills,
line reaming, carbide boring, spot facing,
etc.

Write for full information and prices

GIERN & ANHOLTT TOOL COMPANY
1312 Mt. Elliott Avenue, Detroit, Michigan



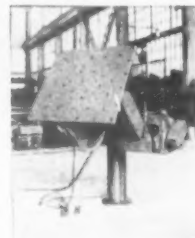
C-F POSITIONERS
are universal tools
... for handling and
holding work.



Capable of tilting, turning and holding giant weld-
ments and assemblies so that every weld can be
made down hand, C-F Positioners also save time,
labor and lower the cost of positioning and holding work
for chipping, snagging, grinding, flame hardening and
machining operations like angular drilling, etc. Today
C-F Positioners are found not only in the welding shops
but in machine shops, die shops and production lines as
well. 6 sizes, capacities from 1,200 lbs. (hand operated)
to 30,000 lbs. Each a universal tool, pedestal mounted,
adjustable for height, with table that turns completely
around and tilts at any angle to 135° from horizontal.

Write for Bulletin WP 22.

(Right) Illustrates
how "C-F" adjustable
height feature assures
ample floor clear-
ance for "any" job.



CULLEN-FRIESTEDT CO.,
1318 S. KILBOURN AVE. CHICAGO, ILLINOIS

Amco GAGES ARE UNEXCELLED FOR QUAL- ITY, ACCURACY AND SERVICE.

Illustrated below are Male and Female Splined Gages made to One
Ten-Thousandths of an Inch Tolerances.



OUR PRODUCT

Straight Side, Serration, Involute Male and Female Splined Gages, Plug, Ring,
Snap, Flush Pin, Profile, Fixture, Length, Width, Thickness and Relation Gages.
We have a complete Spline Engineering Service for your convenience. Gages
with close tolerances are nqrmalized and stabilized. All gages are inspected at
68° Fahrenheit. May we quote on your requirements.

AMCO GAGE COMPANY

19760 West Eight Mile Road

Detroit, Michigan

RUTHMAN GUSHER COOLANT PUMPS

SIMPLE DESIGN

Fewer parts . . . less wear . . . more efficient operation, with Gusher Pumps. You benefit from many features offered **only** in Gusher Pumps.



Model 11020-A

One of the latest and most modern types of coolant pumps. Intake and discharge pass through flange directly into machine making a very neat and efficient installation.

Write for engineering data and specifications.

THE RUTHMAN MACHINERY CO.
1815 READING ROAD, CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

YOU'LL GET
MORE OUT OF YOUR
ARC WELDERS
WHEN YOU READ THIS
VALUABLE BOOK



The most
complete, con-
cise and up-
to-the-minute
text book on
ARC WELDING
ever published

516
Pages
512
Illustrations

GET YOUR COPY NOW! And Learn
the Way to Greater Welding Efficiency
Gives you latest techniques, procedures.
Actually shows correct methods for great-
est weld strength. Completely illustrated.
Will prove to be a daily life-saver. Only
\$2.00 Postpaid. Order today.



HOBART

'Simplified' Arc Welders
The speed-up produc-
tion tool is playing a
giant job in this war.
It will help you, too!
Hobart Bros., Box T-11, Troy, O.

"One of the World's Largest Builders of Arc Welders"

—PASSING PARADE—

• **ROY HUNTER**, direct sales representative in the Northern Ohio and Western Pennsylvania area for Gisholt Machine Company of Madison, Wisconsin, died September 12th at the age of 54. Before becoming a member of the Gisholt field sales personnel, Mr. Hunter had been in the machine tool industry for many years including a long association with the International Machine Tool Company.

• **EDWARD W. P. SMITH**, consulting engineer for The Lincoln Electric Company and an authority on arc welding, was found dead Saturday morning, September 19th, in his berth aboard a train bringing him back to Cleveland from a meeting in Indianapolis. Mr. Smith at the time of his death was 56 years old.

• **FRANCIS G. ECHOLS**, 88, who retired in 1932 as president of the Greenfield Tap and Die Corporation, died recently after an illness of a year. At one time Mr. Echols had been manager of the small tools division of Pratt & Whitney division of Niles-Bement-Pond Company.

• **CHARLES D. GAUDREAU**, treas-
(Continued on page 217)

T. H. L. FRONT LEVER BENCH PUNCH



PRICE WITH ONE
PUNCH AND ONE
DIE—

\$50.00

Immediate
Shipment

Built for hard
tough work — die
cannot lose align-
ment with punch
— all parts inter-
changeable.

Capacity $\frac{1}{2}$ " holes
through $\frac{3}{8}$ " steel;
 $\frac{3}{4}$ " through $\frac{1}{4}$ "
steel. Can also be
made for holes up
to $\frac{7}{8}$ " in thinner
metal. Stock
punches and dies
available from $\frac{1}{8}$ "
to $\frac{1}{2}$ " by 64ths.

Weight, 70 lbs.

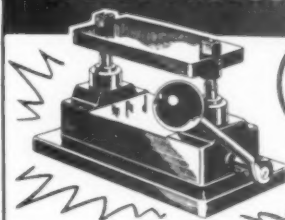
**T. H. LEWTHWAITE
MACHINE CO.**

(Est. 1890)

307 E. 47 St.

NEW YORK

CUTS TOOLING TIME SPEEDS PRODUCTION



\$29.75

THE UNIVERSAL VISE

Gives you a ready-designed drill jig body that greatly reduces the tooling time and helps you get into production faster. You'll be amazed at its loading and unloading speed. Positive, quick action lever locks work instantly — holds securely — throw it back and work is released. No complicated adjustments. No costly drill fixtures needed — just a comparatively inexpensive drill bushing plate and adaptor for each job. Sturdily constructed thruout — nothing to get out of order. Pays for itself many times over. Only \$29.75 f.o.b. Chicago.

ORDER TODAY

Include contract number
or priority certificate

MOHR LINO-SAW COMPANY
122 N. Union Ave., Chicago

A LASALLE DESIGN

Tool Designing

Machine Designing

Aircraft Tool Designing

Product Designing

Engineering Service

LASALLE DESIGNING CO.

634 W. LAKE STREET, CHICAGO, ILL.

Telephone MONroe 2345

Increase your Tapping Output with this New Unit

The features that make this possible include:
1. Four Speeds, ranging from 390 to 2050 R.P.M., efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to 1/2" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand-screw adjustments, maintain pre-set tap feeding and reversing pressure. **INDEPENDENT OF OPERATOR.**

Tap Establishes Its Own Lead

The new Proconier Universal Tapping Machine is exclusively designed so that it actually allows the tap to establish its own lead. There is nothing more accurate than a precision ground thread tap as a guide for tapping—so maximum tapping efficiency is attained where an accurate tap is free to establish its own lead in cutting the thread. This exclusive Proconier feature means more accurate tapping with every thread uniform, greater production with less spoiled work tap breakage.

Proconier

SEND FOR BULLETIN giving full details, description and prices on the full line of Proconier Universal Tapping Machines.

PROCONIER SAFETY CHUCK CO.
12-18 S. Clinton, Chicago, Ill.

Send me bulletins on: ☐ High Speed

Tapping Heads ☐ Tri-Grip Tap Holders ☐ Universal Tapping Machines.

Name.....

Address.....



SHELL REAMER ARBORS



Straight shanks — carbon steel

Number	Price Each	Fitting Size Reamer	Length Overall Inches
RA6	\$3.00	1-1/16—1-9/32	10
RA7	3.30	1-5/16—1-21/32	11
RA8	3.60	1-11/16—2	12
RA9	4.00	2-1/16—2-1/2	13

Taper shanks — carbon steel

Number	Price Each	Fitting Size Reamer	Length Overall Inches	Morse Taper Shank
RA6	\$3.30	1-1/16—1-9/32	10	3
RA7	3.75	1-5/16—1-21/32	11	3
RA8	4.15	1-11/16—2	12	4
RA9	4.65	2-1/16—2-1/2	13	4

specify all tools by our list numbers

SCHULTZ and ANDERSON COMPANY

MACHINE TOOLS

109B Edison Place

Market 2-4318

Newark, N. J.

BALDOR

BALL BEARING GRINDERS

for accurately sharpening

CARBIDE TOOLS



1-YEAR GUARANTEE

BALDOR CARBIDE TOOL GRINDER is precision-built for accurately and quickly sharpening Carbide Tools. Sturdy 1/2 H. P. heavy duty, ball-bearing, reversible Motor. Large adjustable tool-rest tables. Satisfaction guaranteed.

NEW LOW PRICE \$95.00

WRITE FOR BULLETIN 307

BALDOR ELECTRIC COMPANY
4335 Duncan Ave. St. Louis, Mo.

BUILT BY MOTOR SPECIALISTS

ULTRA SURFACE FINISHING

With ACCURATE SIZING And

IMPROVED GRAIN STRUCTURE—ALL ASSURING MUCH LONGER LIFE

SECURED BY BEARING-IZING



Tools For Straight Holes; Concentric Angles, Flats and Contours

Also Combinations of These In One Tool

Ask For Information On Your Job

"HOLE" ENGINEERING SERVICE
5901 FOURTH AVE. DETROIT, MICH.

IMMEDIATE DELIVERY

AUTOMATICS

Cleveland, 7/8 & 2 1/2" Model B
Cleveland, 7/8" 4 spindle, Model M
Gridley, S.S. 2 1/4, 3 1/4 and 4 1/4"
Nos. 22, 23 & 24 New Britain
No. 5A & 6A Potter & Johnston

GRINDERS

No. 3, 4, 15 & 18 Bryant Internal
10 & 14 x 36" Norton Plain, M.D.
2" x 8" Storm Piston
Lapper, 26" Bethel-Playar

LATHES

Putnam, 60" x 17" with 12" Riser Blocks
Schumacher & Boye 18" x 8" c/shaft

MILLING MACHINES

No. 1, 2 & 3 Craftsman Rotary
Nos. 32 & 33 Kempsmith, Mfg., M.D.

PLANERS

Bedford, 39" x 13"—1 Rail & 1 Side Head
Patch 36" x 13"—1 Rail & Side Head

PRESSES

No. 34 Toledo Solid Back, Geared
No. 2, 3, 4 Ferracute Solid Back
No. 77B Niagara Dble Crank

MACHINE TOOLS

POWER PRESSES



546 Second Ave.

Detroit, Mich.



DIE SETTING TIME TO MINUTES WITH WALES HOLE PUNCHING DIES

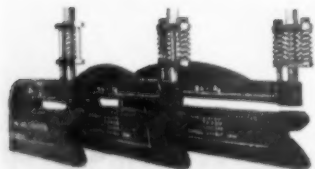
Die setting time is cut from hours to minutes by Wales patented Holder. Wales Punches and Dies are always in perfect alignment.

FOR PATTERNS UNLIMITED each individual holder can be reset or removed from rail, template, or T-slotted plate quickly. This provides practically continuous press operation by making it possible to slide one set-up out of the press and another set-up into position. Nothing is attached to press ram.

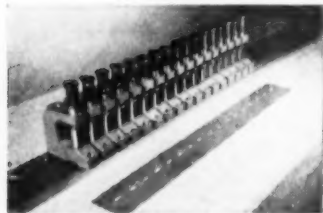
Wales Punches and Dies are available in a wide range of standard sizes and shapes. There's always something new in the Wales Line. Keep posted by writing to —

THE STRIPPIT CORPORATION

George F. Wales, President
NORTH TONAWANDA, N. Y.
Specialists in Punching and Notching Equipment

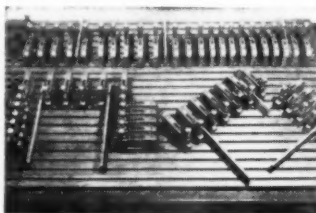


↑ Above shows Wales "Selective Strippers" of 1, 2, or 3 interchangeable springs for exact stripping action for each job.



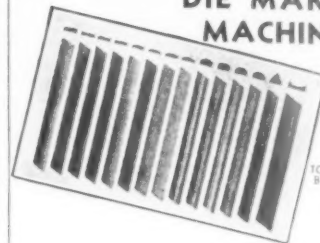
← Line-up of Wales Punch and Die Holders mounted on press rail.

→ Showing 3 set-ups of Wales Dies on one T-slotted plate.



Sail THROUGH ANY STORM WITH GROB HIGH GRADE STEEL FILES AND

DIE MAKING MACHINERY



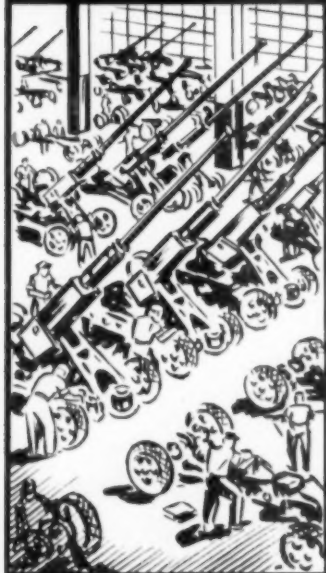
—THE TOOLMAKER'S BEST FRIEND—

Grob files are accurate, quality files that remove more stock and cut faster. Get the best—GROB die cutting machines and files.

WRITE OR WIRE FOR DETAILS AND PRICES



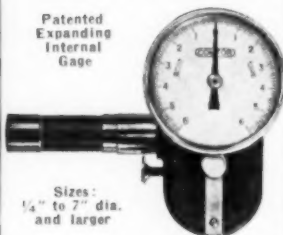
Is your Gaging geared to WAR?



Learners quickly become skilled gagers with

COMTORPLUG

Patented
Expanding
Internal
Gage



Sizes:
1/4" to 7" dia.
and larger

Truly an amazing gage, Comtorplug meets the demands of the most critical inspectors, and at the same time enables learners in the shop to gage accurately to fractions of .0001"! Automatic features assure positive 2-point gaging, enabling user to ACTUALLY MEASURE (not a limit gage) any part of a bore and detect out-of-round, front or back taper, barrel shape, bell mouth, etc. NOT A PASSING READING. Prominent in airplane and ordnance work, at the machine, at the inspector's bench. Investigate!

Request Bulletin 27

THE COMTOR CO.

70 Rumford Ave.
Waltham, Mass.

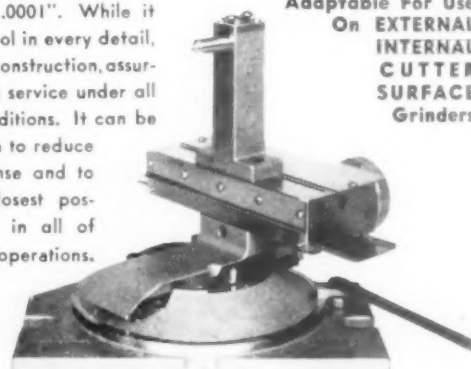
VINCO Angle Tangent to Radius DRESSER

For The FASTEST, MOST ACCURATE Method of Dressing Abrasive Wheels

The Vinco Dresser meets every forming requirement in dressing radii, angles and angles tangent to radii on abrasive wheels. All operations are performed from the same axis without the necessity of moving the diamond.

Dressing accuracy is guaranteed to within .0001". While it is a precision tool in every detail, it is of rugged construction, assuring trouble-free service under all production conditions. It can be depended upon to reduce time and expense and to provide the closest possible accuracy in all of your dressing operations.

Write for
Descriptive
Folder



Adaptable For Use
On EXTERNAL
INTERNAL
CUTTER
SURFACE
Grinders

VINCO
Corporation

9115 SCHAEFER HIGHWAY
DETROIT, MICHIGAN, U.S.A.

USED MACHINERY DEALER HELPS WIN WAR...

by keeping his eyes peeled . . . his ears to the ground . . . to detect and procure idle Machinery for War Work. Not an easy job in itself, yet he doesn't stop there. He burns telegraph and telephone lines to find idle machinery . . . then with his facilities rebuilds this Machinery so that it can be put to work promptly.

O'BRIEN OF PHILADELPHIA KNOWS HOW!!

That briefly is what we have been doing since the outbreak of the War and for more than a quarter century before it. Our entire organization and fac-

ilities are hard at work securing, rebuilding, and placing machinery for vital war needs. Finding employment for idle machinery for vital war needs. Finding employment for idle machinery on hand puts Victory into production faster than building new machinery. Because it contributes to Victory, it's a job of which we're proud.

As a result of our 27 years experience we now have on hand, not yet allocated, some very desirable MACHINE TOOLS and EQUIPMENT for the STEAM & ELECTRICAL POWER PLANT waiting to aid the war effort.

★ PARTIAL LISTING OF ITEMS IN STOCK, SUBJECT TO PRIOR SALE ★

LATHES

26"-48"x16" McCabe double spindle, belt drive
23"-48"x12" Putnam extension bed Gap Lathe, belt drive
24" x 12" LeBlond, belt drive, plain change gear
21" x 8" LeBlond, belt drive, quick change
20" x 14" Springfield, geared head, motor drive, quick change
20" x 8" LeBlond geared head, motor drive, quick change
18" x 14" Hamilton, belt drive, quick change

MISCELLANEOUS

5" Bickford Plain Radial Drill, gear box, motor drive
66" swing Betts, Vertical Boring Mill, 2 heads, belt drive

No. 62 Bliss Drawing Press, 8" stroke
25-ton Henry & Wright Dieing Machine, 5 1/2" single roll feed
Henderson geared Forming Press, bed 20x50, 40-ton capacity
24"x24"x6" Putnam Planer, one head, belt drive
200-ton Caldwell Wheel Press, 38" between the bars, motor drive
10" Buckston Vertical Slotter, 24" rotary table, power feeds

GRINDERS

12"x36" Pratt & Whitney, Vertical Surface, belt drive
No. 6 Bryant Internal Grinder, motor drive
No. 60 Hcad Internal Cylinder Grinder
18" Townsend Disc Grinder, 2 universal tables, 1/2" drive

MILLING MACHINES

2-No. 3 Brown & Sharpe Vertical, Motor drive, table 66" x 16 1/2"
No. 2B heavy Brown & Sharpe Plain, motor drive, table 43" x 12 1/2"
No. 3 Cincinnati Universal Milling Machine, belt drive, table 38" x 8", regular equipment
No. 5 Jackson Vertical Die Sinker, table 41" x 13", hand feeds, belt drive
No. 3 Lees-Bradner Thread Miller, capacity about 3" x 6", motorized Chicago Hand Miller, table 20" x 7", belt drive

TURRET LATHES

32" Bogart heavy duty 4" hollow spindle, 28" 4-jaw chuck, belt drive

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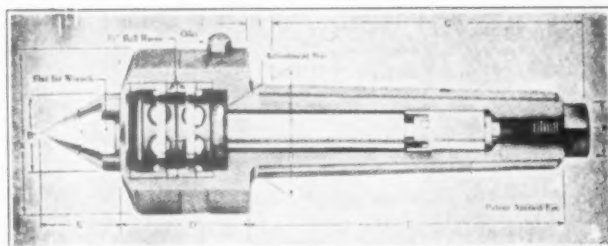
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NOVEMBER MEETINGS

BINGHAMTON — November 4, 7:30 P. M. The Sherwood Hotel, Greene, New York. The speaker for this meeting will be Mr. A. F. Hasty who will talk on "Merits and Possibilities of Precision Honing."

CINCINNATI — November 10, 8:00 P. M. Grill of the Hotel Alms. The speaker will be Mr. Lee Weller, development engineer of the General Electric Company. His subject will be "Action of Metal Cutting Tools as Seen Through the High Speed Camera." Refreshments will be served after the meeting.

CLEVELAND — November 13, Dinner 6:30 P. M. Technical Session 8:30. Mid-Day Club, top floor of the Union Commerce Building. The speaker will be Ernest J. Abbott, technical director, Physicists Research Company. His talk is entitled "Designation of Surface Finishes." Reservations: Henderson 4190, Bob Alexander.

DAYTON — November 9. Milton Feldstein of Delco Products will speak on "Tooling Problems of the Emergency" and G. O. Thomson, division manager of Behr Manning Corporation, will talk about "Modern Coated Abrasives."

FOND DU LAC — November 13. This will be a dinner meeting celebrating the first anniversary of the Chapter.

HAMILTON — November 13, 7:00 P. M. Iroquois Hotel at Galt, Ontario. The speaker will be Mr. R. T. Wise, Director General Gage and Cutting Tool Production Branch — Dept. of Munitions and Supplies. His talk will be on cutting tools and gages.

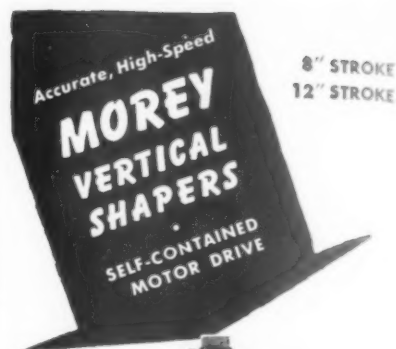
NORTHERN NEW JERSEY — November 7. Robert Treat Hotel. This will be the birthday dinner dance of this Chapter.

ROCHESTER — November 11, 6:15 P. M. University of Rochester. The speaker will be Lester Dettnerbeck who will talk on "Screw Machine Tooling and Layouts." Reservations: C. G. Newton, Stone 2893.

ROCKFORD — November 5. Dinner 7:30. Faust Hotel. This meeting will be the Annual Ladies Night. Speaker for the evening will be Frederick S. Marquardt, Far Eastern expert for the Chicago Sun. He will talk on "The Battle of the Pacific." Reservations: John Bruetzman, Allis Chalmers, 510 Gas-Electric Bldg., Rockford.

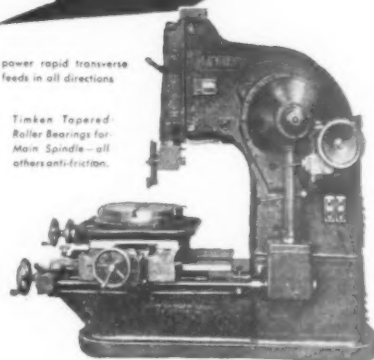
ST. LOUIS — November 12. Dinner 6:30 P. M. Hotel Melbourne. Speaker is Mr. E. S. Patch, sales manager of the Moraine Products Division of General Motors. Mr. Patch will talk on "Powdered Metals in Machine Design."

SYRACUSE — November 10. Dinner



power rapid transverse feeds in all directions

Timken Tapered Roller Bearings for Main Spindle—all others anti-friction.

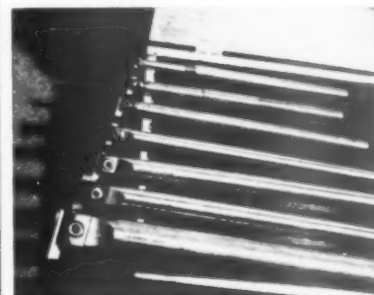


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MEETINGS

7:00 P. M. Technical Session 8:00.
Onandaga Hotel. Philip M. McKenna
will speak on "Steel-Cutting Carbide
Tools, Their Design and Use." Res-
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PASSING PARADE

(Continued from page 212)

urer of the Bay State Tool & Machine
Company at Springfield, Massachu-
setts, died at his home recently.

• CHARLES P. FAY, 83, retired
vice president and general manager of
the Stevens Arms Company at Spring-
field, Massachusetts, died recently.

• GEORGE A. GOSS, 61, vice presi-
dent and director of the Scovill Manu-
facturing Company at Waterbury,
Conn., died in Middlebury after a
brief illness.

• CHARLES C. RUSSELL, 71, pio-
neer in the small tool industry in
Greenfield, Massachusetts, died re-
cently of pneumonia following a brief
illness. Retired of late, Mr. Russell
had been long associated with the
Wiley & Russell Manufacturing Com-
pany, now a part of the Greenfield
Tap & Die Corporation, and the Rus-
sell Manufacturing Company.

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For Greater Drill-Press Output

Whenever a drill
comes down, some-
thing must hold the
work. Wherever a
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holds with relentless pressure; is un-
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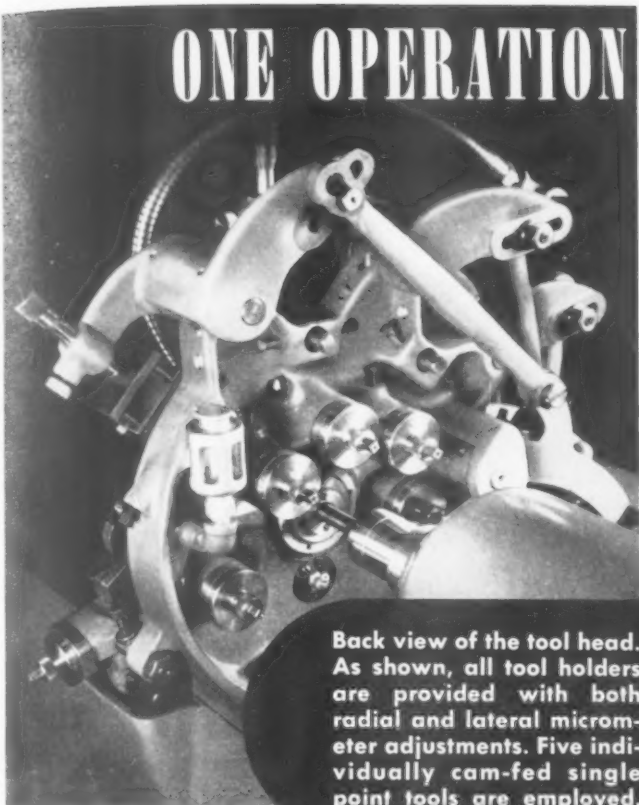
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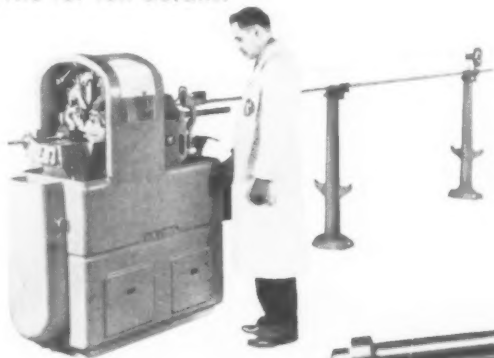
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Part—9/16" long—four diameters between 1/16" and 5/16"—one formed curved surface — one counterbore formed without use of attachments.
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Tolerance— ±.0005" on all diameters.
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Part—2" long—three diameters between 1/8" and 5/32"—threads, 32 per inch, produced with self-opening rotary die head mounted on threading attachment—a standard accessory for the machine.
Material—Stainless Steel.
Production—40 per hour.
Tolerance— ±.0002" on center diameter.
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Part—4 7/8" long—four diameters between 7/64" and 9/32"—two pivot points—one taper. Double feed is used to secure extra length.
Material—High Carbon Steel.
Production—15 per hour.
Tolerance— ±.0005" on all diameters.
Finish—25 to 50 Micro-inches.



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(SWISS TYPE)

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NOVEMBER, 1942

219

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YOU CAN HELP by sending to the steel maker at once **EVERY** worn-out or broken high speed steel cutter in your plant.

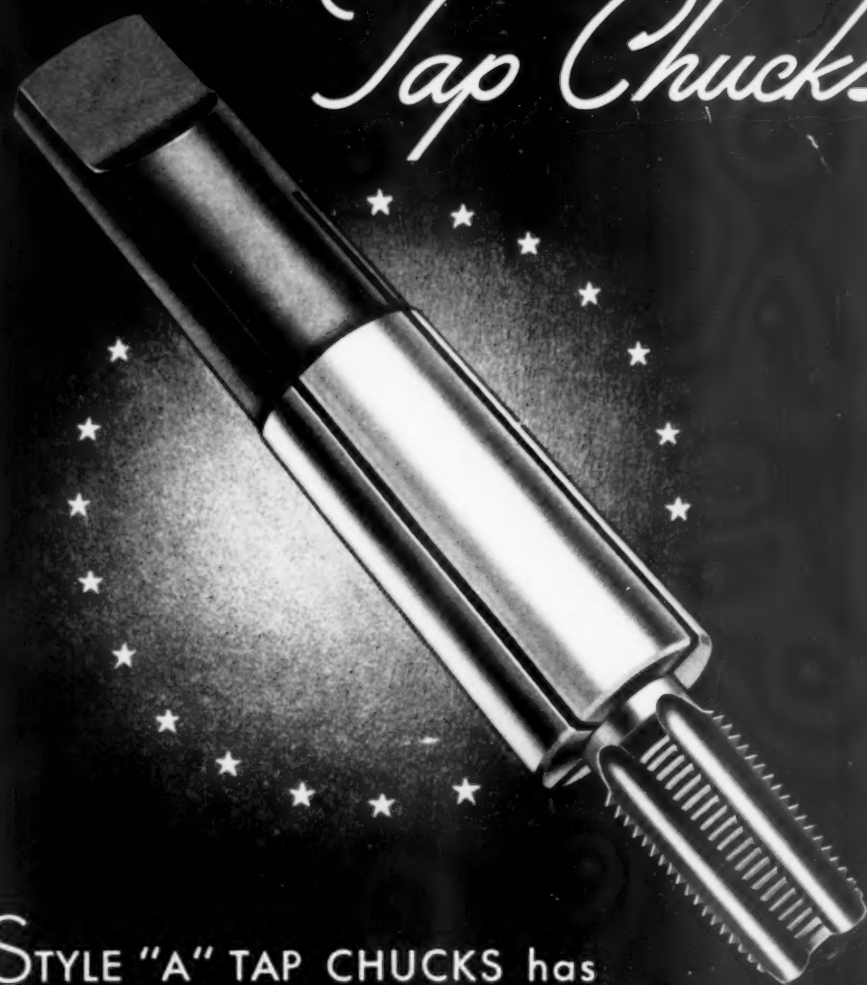
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